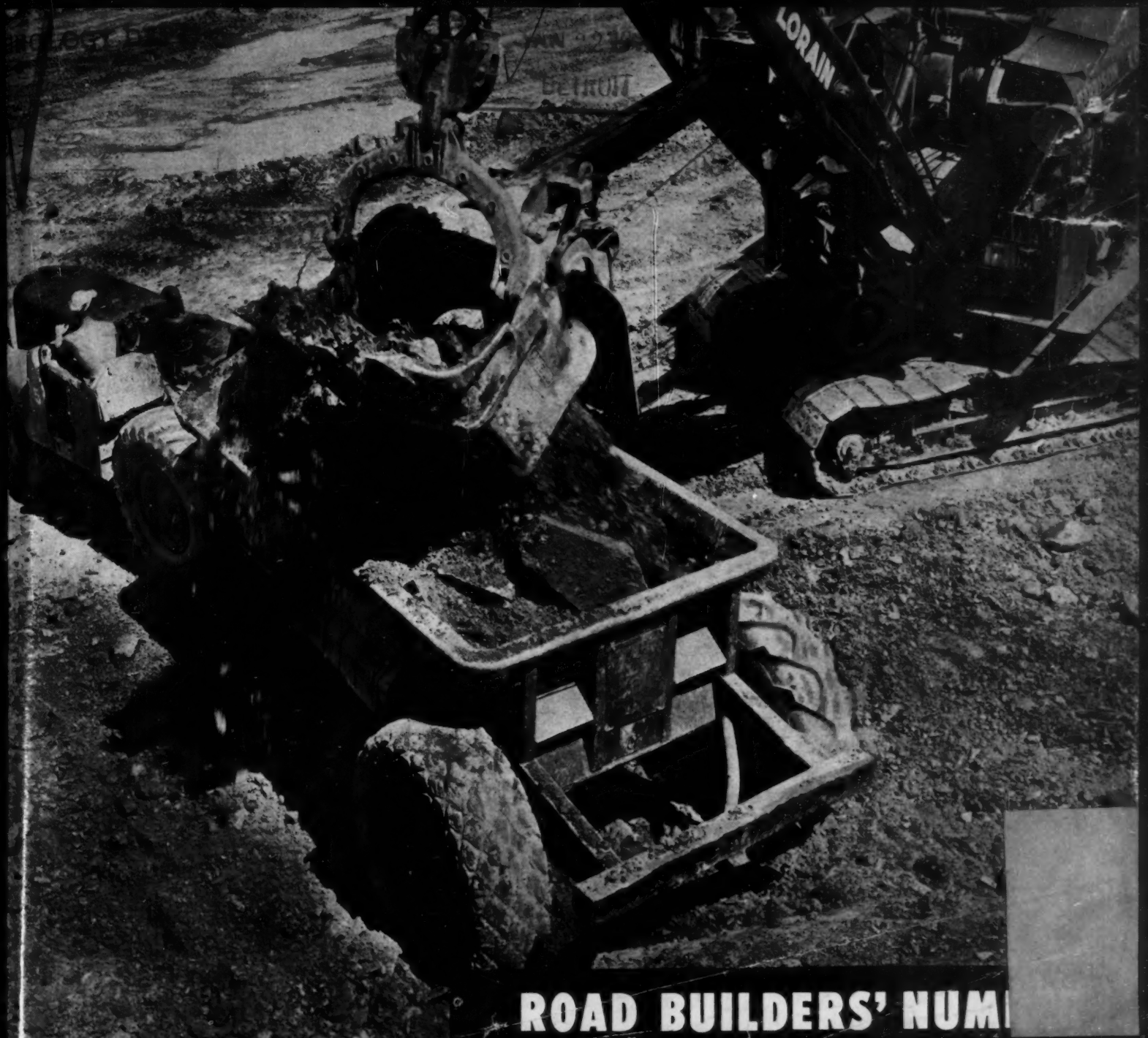


JANUARY 1946

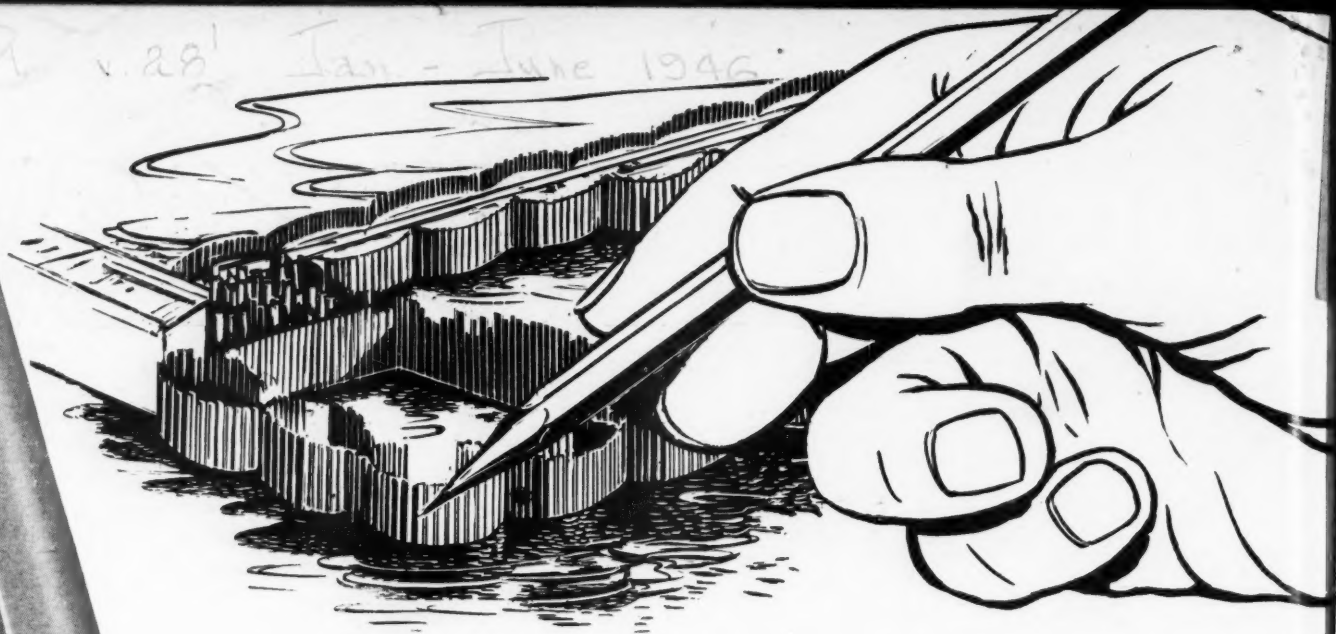
airport grading at Charleston, W. Va., calls into action powerful earthmoving units.



ROAD BUILDERS' NUM

INLAND

Q. 281 Jan - June 1946



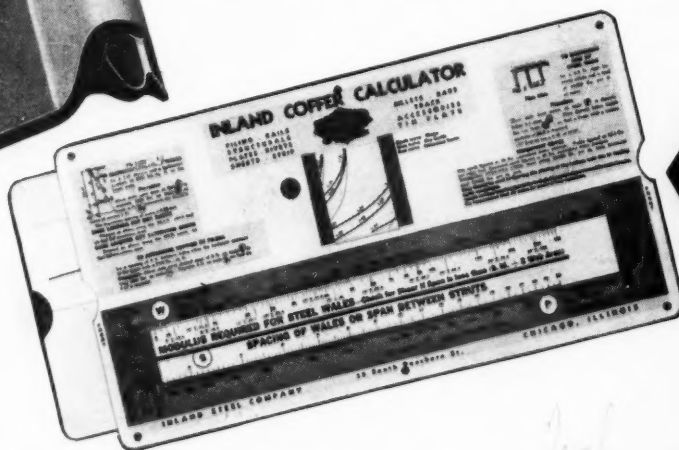
Inland Piling . . .

**offers definite advantages for
efficient coffer dam construction!**

Inland steel sheet piling is scientifically designed to drive freely and to produce water-tight piling jobs. Accurately rolled of special steel, it can be driven, pulled and redriven many times.

Ability to produce uniform high quality piling is only a part of Inland service. From the earliest plans for a job to completion of the project, Inland engineers cooperate on design, method, or in any other way that may prove helpful.

Inland can furnish wales, tie rod, and other accessories in conjunction with quotations on sheet piling. We also roll other forms of steel often used on piling jobs—H piling, structural shapes, Hi-Bond reinforcing bars, 4-way safety floor plate, etc.



We have recently designed the Inland Coffey Calculator. This device cuts hours from the time required to figure piling jobs. We will be pleased to send one to engineers engaged in this type of work.

LAND STEEL CO.

38 South Dearborn Street, Chicago 3, Illinois

ices: CINCINNATI • DETROIT • INDIANAPOLIS • KANSAS CITY • MILWAUKEE
NEW YORK • ST. LOUIS • ST. PAUL

ARS • FLOOR PLATE • PILING • PLATES • RAILS • REINFORCING BARS • SHEETS • STRIP • STRUCTURALS • TIN PLATE • TRACK ACCESSORIES

CURRENT JOBS

... and Who's Doing Them

BUILDINGS

Public—Hospital facilities in Peekskill, N. Y., will be built by **Caldwell-Wingate Co.**, of New York, for \$11,297,000. Navy contract for laboratory at Inyokern, Calif., went to **Peter Kiewit Sons Co.**, of Los Angeles, for \$4,996,800. Low bid of \$1,736,875 was received from **John McShain, Inc.**, for hospital at Salisbury Md.

Industrial—Contract for chemical plant at Port Neches, Tex., was awarded to **Stone & Webster Engineering Corp.**, of New York, N. Y., for \$10,000,000. **Patrick Warren Constr. Co.**, of Chicago, Ill., will build \$8,000,000 plant at St. Louis, Mo. **Thorgersen & Erickson**, of Chicago, Ill., has \$6,000,000 contract for Flint, Mich., plant. Contract for \$5,000,000 plant at Toledo, Ohio, went to **Stone & Webster Engineering Corp.** of Boston, Mass. Plant warehouse at Midland, Mich., will be constructed by **The Austin Co.**, of Detroit, for \$2,500,000. **Tellepsen Constr. Co.**, of Houston, Tex., has contract for \$2,000,000 plant at Freeport. Bottling house at Milwaukee, Wis., will be built by **Edward Steigerwald & Sons, Inc.**, of Milwaukee, for \$2,000,000. **Siesel Constr. Co.**, of Pittsburgh, Pa., will build \$1,750,000 factory at Springdale. Factory at Pittsburgh will be constructed by **Ragner-Benson, Inc.**, of Chicago, Ill., for \$1,500,000.

Commercial—Community center at Houston, Tex., will be built by **Stone & Webster Engineering Corp.**, of New York. **Frank Messer & Sons, Inc.**, of Cincinnati, Ohio, has \$8,000,000 contract for hotel in Cincinnati. **R. C. Wieboldt Co.**, of Chicago, Ill., will build \$2,000,000 hotel in Evanston. Department store in Los Angeles, Calif., will be built for \$2,000,000 by **J. H. Marks Co.**, of Los Angeles.

HEAVY CONSTRUCTION

Contract for purification plant improvements in Dallas, Tex., was awarded to **T. C. Bateson Co.**, of Dallas, for \$2,058,000. Low bid of \$1,810,825 was submitted by **M. H. Golden Constr. Co.**, of San Diego, Calif., for Navy piers. Wind tunnel at Dangerfield, Tex., will be built by **Pittsburgh-Des Moines Steel Co.**, of Pittsburgh, Pa., for \$1,529,530. **Frederickson & Watson Constr. Co.**, of Oakland, Calif., will build \$1,446,454 runway and taxiways at Moffett Field.

HIGHWAYS

Among recent highway contract awards are the following: California: \$491,981 to **Oilfields Trucking Co.**, of Bakersfield; \$632,869 to **G. Herz & Co.**, of San Bernardino; \$1,879,341 to **J. H. Pomeroy & Co.**, of San Francisco; \$1,333,066 to **Peter Kiewit Sons Co.**, of Los Angeles; and \$503,948 to **Dimmitt & Taylor**, of Los Angeles. New York: \$699,397 to **Joseph Breen Constr. Corp.**, of New York; \$647,420 to **L. Mayersohn**, of Albany; \$542,917 and \$742,631 to **The Lane Constr. Co.**, of Meriden, Conn.

CONSTRUCTION METHODS was founded in 1919, under the name of SUCCESSFUL METHODS, by the Manufacturers Publicity Bureau, Inc., of Chicago, representing a group of non-competing manufacturers of construction equipment. **Charles R. Thomas**, editor of the first few issues, was succeeded by **William Jabine**.

In 1926 the McGraw-Hill Publishing Company, Inc., of New York, purchased the publication, changing its name to SUCCESSFUL CONSTRUCTION METHODS in November of that year, to CONSTRUCTION METHODS in May, 1927, and to CONSTRUCTION Methods and Equipment in December, 1936. In October, 1939, the name CONSTRUCTION METHODS was resumed. All rights to the foregoing titles are reserved by the publishers.

Robert K. Tomlin was appointed editor of CONSTRUCTION METHODS in January, 1928 and was succeeded by **Waldo G. Bowman** in January, 1946.

McGraw-Hill Publishing Company, Inc., 330 West 42d Street, New York (18), N. Y.

JAMES H. McGRAW, Founder and Honorary Chairman

Editorial and Publishing Offices: 330 West 42nd St., New York (18); 520 North Michigan Ave., Chicago (1); 68 Post St., San Francisco (4); 738-9 Oliver Bldg., Pittsburgh; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Los Angeles; Atlanta, Ga.

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CONSTRUCTION METHODS, January, 1946. Volume 28, Number 1. Published Monthly, price 20¢ a copy. **Return Postage Guaranteed.** Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York (18), N. Y. **Subscription rates**—United States, Mexico and Central and South American countries, \$2.00 a year, \$3.00 for two years, \$4.00 for three years. Canada, \$2.50 a year, \$3.50 for two years, \$5.00 for three years. All other countries, \$3.00 a year, \$6.00 for three years. Please indicate position and company connection on all subscription orders. Entered (reentered) as second class matter December 16, 1936, at the Post Office of New York, N. Y., U. S. A., under the act of March 3rd, 1879. Printed in U. S. A. Cable address: "McGrawhill, New York." Member of A. B. P., Member of A. B. C. Contents copyrighted 1945 by McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York (18), N. Y.—All rights reserved.

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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WALDO G. BOWMAN, Editor

Harold W. Richardson, Executive Editor Robert K. Tomlin, Managing Editor

New York: Donald D. King; Nelle Fitzgerald; Patricia McGerr

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Washington: A. N. Carter; Donald D. Hogate

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DETROIT

THE How OF IT

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

- How **SPECIAL BULLDOZER ATTACHMENT** uproots trees in single operation —p. 75
- How **ROADS AND STREETS** will be constructed and maintained in 4-year program at estimated cost of \$7,500,000,000 —p. 78
- How **HEAVY CONSTRUCTION EQUIPMENT** will be used for highways in new federal-aid program —p. 80
- How **HYDRAULIC CAR TILTER** was used to unload muck in Brooklyn-Battery Tunnel —p. 83
- How **UNREINFORCED PAVEMENT** of air-entrained concrete was built in North Dakota —p. 84
- How **WEST VIRGINIA AIRPORT PROJECT** involved 10,000,000-yd. earth-moving job —p. 86
- How **LIMEROCK BASE ROADS** in Florida were widened and reconditioned —p. 90
- How **DUAL-LANE HIGHWAY** involved heavy grading, unreinforced concrete pavement and bridge —p. 92
- How **SPECIAL REFINEMENTS** aided operations on Illinois resurfacing job —p. 94
- How **TRACTOR-SCRAPERS** spread gravel on Mexican highway —p. 96
- How **NEW EQUIPMENT** will increase construction output during 1946 —p. 97
- How **RUNWAY FOR 300,000-LB. PLANES** was built at California airbase —p. 109
- How **BITUMINOUS CONCRETE** was used for pavement widening and resurfacing in Ohio —p. 113
- How **RESURFACING** strengthened pavement on Washington-Baltimore artery —p. 116

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New York 18, N. Y.

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Old Address

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New Company Connection

New Title or Position

Clark Bros.

SUBJECT: TORQUE CONVERTER TRACTOR
OWNER: CLARK BROS. CONSTRUCTION CO., Hinton, Iowa

PURCHASED
JULY, 1941

AUGUST 20, 1943.
Only a partial Overhaul
after 6,100 HOURS
OF OPERATION.

MARCH 24, 1945.
First Complete Overhaul,
after 14,000 HOURS
OF OPERATION.

Owner's opinion at this time--
"The Torque Converter is wonderful. It's easy on the tractor--operation is smooth, no jerking. Original master clutch is still on the tractor --in fact, we've never even taken up on the clutch!"

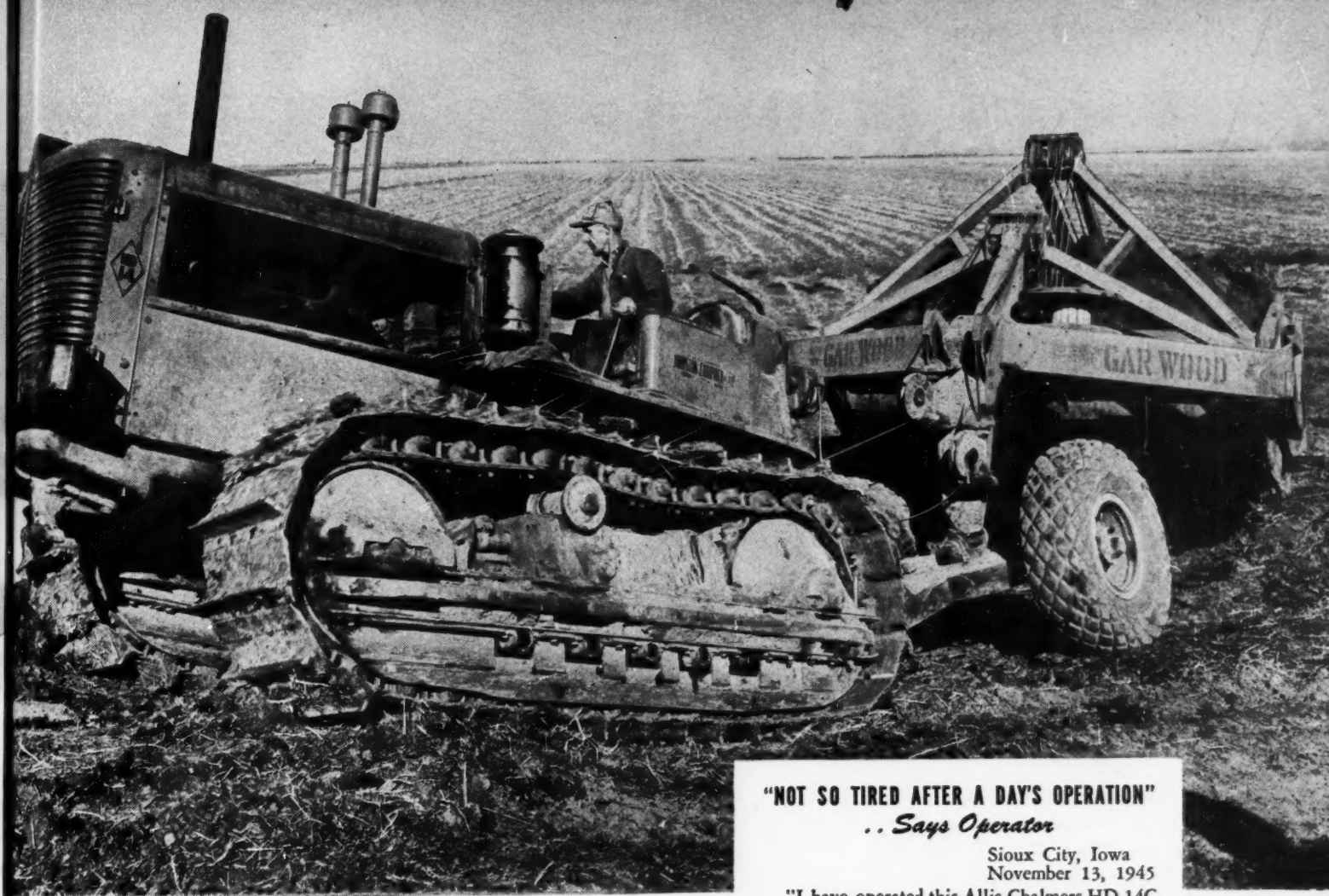
Said the owner then--"I am most pleased with the service record of the Allis-Chalmers Torque Converter Tractor. Besides, it has moved more yardage than any of my other tractors."

Operating the Gar Wood 515 cable scraper, Clark's Torque Converter tractor packs in bigger loads, moves them faster, smoother, with less operator effort . . . reduces maintenance cost of entire outfit.

Here's how the HD-14C Torque Converter tractor looks today . . . streamlined to the minute in appearance and performance.



Let the Record Speak!



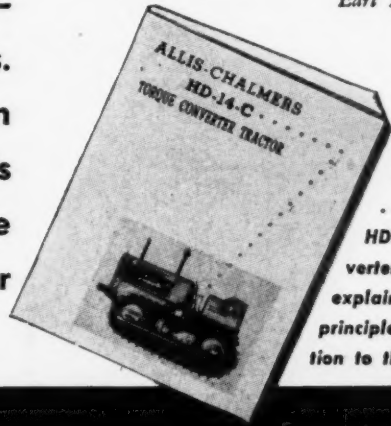
CLARK BROS. was one of many to test the HD-14C, Torque Converter tractor. All were told to "give it the works." It has proved itself everywhere . . . OUTSERVICED, OUTPRODUCED conventional tractors under the most severe operating conditions. You can be sure you aren't experimenting when you put the Torque Converter tractor to work. It's a thoroughly TESTED, FINISHED PRODUCT . . . the tractor of the times! Get all the facts from your Allis-Chalmers dealer . . . NOW!

"NOT SO TIRED AFTER A DAY'S OPERATION" .. Says Operator

Sioux City, Iowa
November 13, 1945

"I have operated this Allis-Chalmers HD-14C Tractor for over four years for Mr. Clark of the Clark Construction Company, Hinton, Iowa, and will say that the Torque Converter has it all over the gear type tractors. It has much smoother power and does more work. It is a lot easier to operate than the old tractor. "I do not feel as tired at night after operating this tractor without all of that gear shifting."

Earl King, Operator



FREE!

Write for this book . . . "Allis-Chalmers HD-14C Torque Converter Tractor" . . . fully explains torque converter principle and its application to the HD-14C.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

THE JOB JESTER

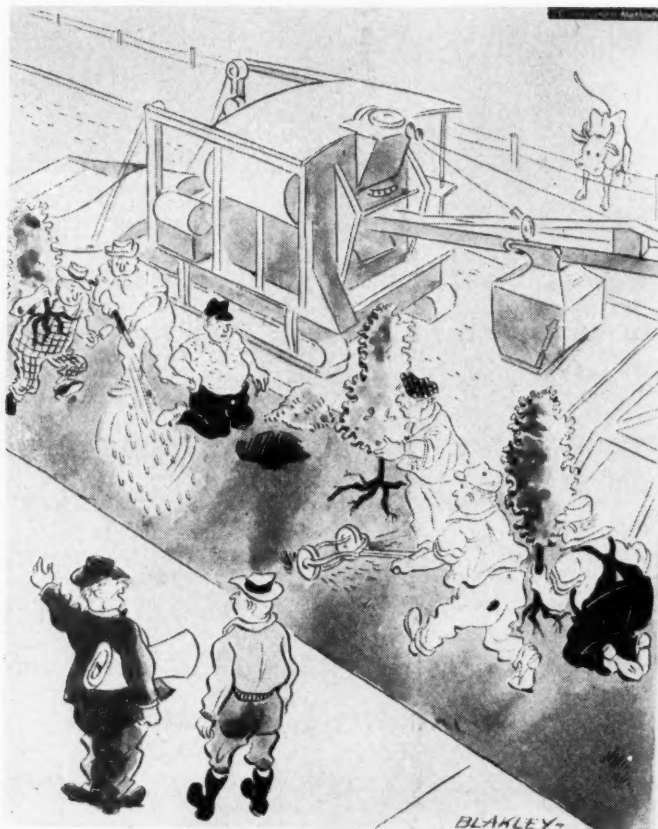
CARTOONS DRAWN FOR CONSTRUCTION METHODS



"Mixup or no mixup, I got my orders and nobody gets by without paying me a dime."



"He's the state highway engineer and these are specifications for removing his appendix."



"Since they got interested in road beautification, I can't keep them at paving."

sub-Freezing

NO PROBLEM



AT THE Navy's Submarine Base, New London, Conn., picked men of nerve and intelligence underwent the toughest kind of training. Needed in a hurry was a huge, new Drill Hall. Cold weather caught up with the job last winter with the roof still to be poured. So White Construction Company, New York, General Contractor, used 'Incor' 24-Hour Cement to—

**MINIMIZE FORM REQUIREMENTS
REDUCE HEAT-PROTECTION COSTS
SPEED COMPLETION**

Good job planning, taking full advantage of dependable 'Incor' high early strength, did the trick. 'Incor' makes cold-weather work practical and economical. Use 'Incor'* this winter—save time, money and worry.

*Reg. U. S. Pat. Off.



LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS.
KANSAS CITY, MO. • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS 25-MILLION BARRELS ANNUAL CAPACITY

A SERVICE AS RELIABLE AS THE PRODUCTS

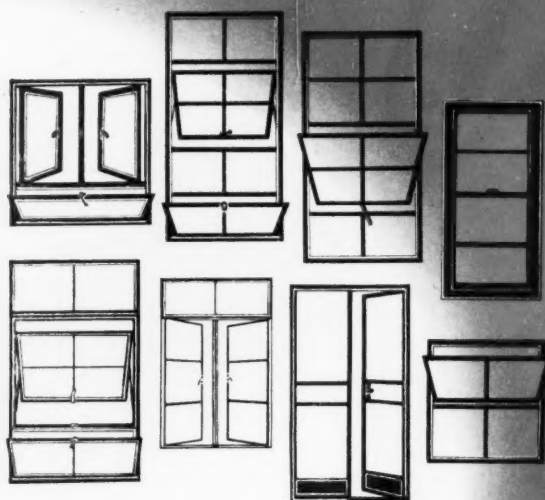
**WAREHOUSE
STEEL PRODUCTS**

**BATES GRATES
OPEN STEEL FLOORING**

**APS PLASTEEL
ROOFING and SIDING**

and now—

**THORN
• STEEL •
WINDOWS**



DURING the war years just past, despite scarcity of materials, manpower shortages and restrictions, Levinson maintained its reputation for reliable warehouse service.

During these years, particularly in the tri-state area, they met the ever-increasing demands for such high-quality products as Plasteel Roofing and Bates Grates.

Levinson has been almost fanatically discriminating in their selection of the products they distribute. No less selective was the choice of THORN Steel Windows, now also being distributed by Levinson Steel Sales Co.

These products, proven by time and performance, are backed by a service as reliable as the products!

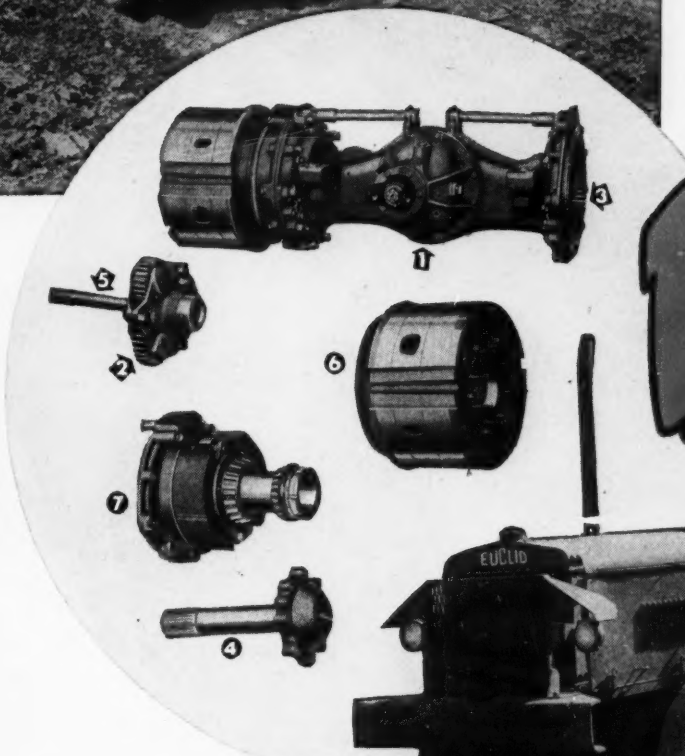


LEVINSON STEEL SALES CO.
Pittsburgh 19, Pa.



When you need
PULL

EUCLIDS
have it!



Advantages of **EUCLID**

Planetary Drive Axle

The driving parts of the Euclid axle are: (a) — a primary reduction consisting of conventional spiral bevel ring gear, pinion and differential (1); (b) — secondary reduction of two floating planetary gear sets (2) each made up of a sun gear, three planetary gears and internal ring gear (3). The only parts carrying the full driving load are the outer drive axles and hub caps (4). The inner axles (5) carry less than 1/5 of the load delivered to the driving wheels (6). The use of the planetary reductions makes possible minimum gear reductions in the transmission and differential and results in much lighter loads being imposed on all parts between the planetary gears and engine.

Full-floating drive axle has exceptional strength

One reason for the wide use of Euclids on tough, off-the-highway hauls is the double reduction planetary drive axle used in both Rear-Dump and Bottom-Dump Euclids.

By this system of gear reduction, tremendous pulling power is attained with comparatively little burden on the intermediate driving parts. This results in greatly prolonged life of axle driving parts.

The Euclid drive axle is full-floating — all of the rear axle load being carried on

heavy-duty tapered roller bearings mounted on hollow spindles which keep axle shafts and gears entirely free from vehicle and payload weight. The entire drive axle assembly is precision built and all working parts are completely enclosed in an oil bath.

The dependable performance of the Euclid axle — its strength and capacity — is unequaled by any other axle in heavy duty hauling equipment. It is an important factor in the long life and efficiency of Euclids.

The EUCLID ROAD MACHINERY Co. . . . CLEVELAND 17, OHIO

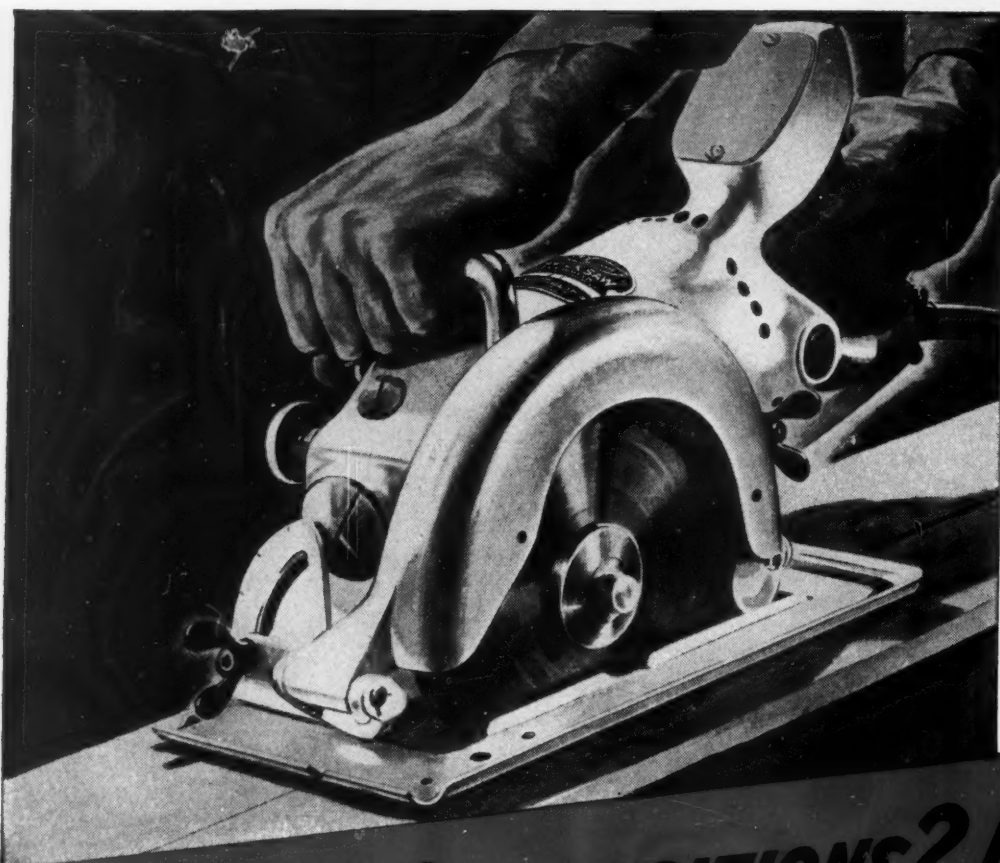


EUCLIDS



Move the Earth





COMBINATION BLADE for all ripping, general cross-cutting.



CROSS-CUTTING BLADE for fast, smooth cross-cutting work.



PLANER BLADE for very smooth cutting and mitering jobs.

WOODS? COMPOSITIONS? METALS? "Quick-Saws" Cut 'em All!

No matter what materials you're using, versatile Black & Decker Electric "Quick-Saws" save you time, money, muscle, manpower. Equipped with the right blades and abrasive discs (shown at the right) they saw a wide variety of materials . . . make a wide variety of cuts . . . *help you turn out ten times the work with one-tenth the effort.*

"Quick-Saws" can be adjusted quickly, easily, for angle or depth of cut. They cut cleanly and accurately. They're streamlined and weight-saving, give top performance whether in your shop or on the job.

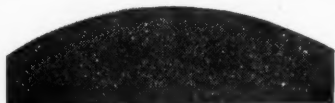
There are three "Quick-Saw" models: No. 75, cuts to $2\frac{3}{8}$ " depth, \$105; No. 85, cuts to $2\frac{5}{8}$ " depth, \$122; No. 95, cuts to $3\frac{1}{8}$ " depth, \$140. For more information, see your nearby Black & Decker distributor. For our illustrated "Electric Saw Handbook" address: The Black & Decker Mfg. Co., 659 Pennsylvania Ave., Towson 4, Maryland.



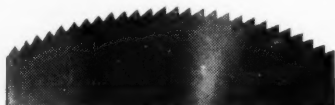
GROOVING BLADE for cutting grooves, similar to dadoing.



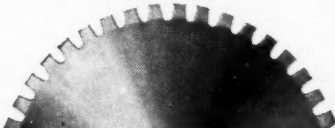
DIAMOND RIM BLADE cuts stone, ceramics, very hard materials.



ABRASIVE DISCS for cutting and slotting marble, tile, etc.

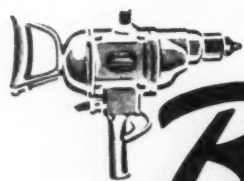


METAL-CUTTING BLADE for cutting soft, non-ferrous metals.



FRICTION BLADE for cutting corrugated, galvanized sheet.

* Trade-Mark Reg. U.S. Pat. Off.



LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS



Trailer built by Rogers Bros. Corp.

\$12,000 worth of tires for one 30-mile trip

A typical example of B. F. Goodrich development in tires

ARMY engineers wanted a secret load moved to the middle of a western desert. It weighed 230 tons. Time was all-important. How to get it there? Build a railroad? That was costly and slow. Move it by truck? No truck or trailer ever built would carry this load.

It was decided to design and build a huge trailer—if tires could be found to carry the load. And the trailer had to be built in 30 days. Engineers came to B. F. Goodrich with their tire problem—found just what they were looking for. B. F. Goodrich built special truck tires based on the desert tire principle developed previously by the

company. These are wide-bottomed tires that don't sink into soft sand. Tires that can carry a terrific load.

Sixty-four big B. F. Goodrich tires, each weighing 220 pounds, were mounted on the trailer—eight rows of tires, eight in each row. The trailer was more than 39 feet long, nearly 17 feet wide, and weighed 73 tons. It was built to carry a total load of 300 tons—the heaviest load ever hauled on pneumatic tires.

Army tanks pushed and pulled the loaded trailer from the railroad siding to the desert. The load arrived safely

and on schedule. Twelve thousand dollars' worth of tires, still usable but made primarily for this one trip that may have shortened the war.

This example of B. F. Goodrich ability to meet an unusual transportation problem is typical of the research and development carried on constantly by the company. Research which means better tires for trucks, cars, airplanes, farm vehicles, and industrial equipment. *The B. F. Goodrich Co., Akron, O.*

Truck Tires BY
B. F. Goodrich

Rugged Enough FOR THE DIVE BOMBER

VICKERS HYDRAULIC CONTROLS

ALSO make Construction Equipment MORE DEPENDABLE

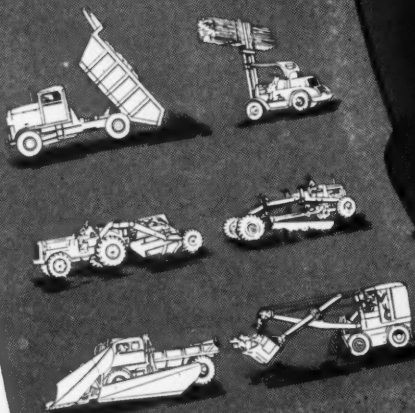
When a dive bomber pointed the nose of his plane at the target and began that lightning-like dive, his life and hitting the target depended on the plane's controls. Vickers produced the dependable power hydraulic controls which, in spite of difficult weight limitations, met these exacting dive bomber standards. Vickers also produced dependable controls for many other types of important war implements.

Dependable controls are vital in construction equipment too. While life and the turn of battle do not depend on them, many other factors of importance do.

Vickers Power Hydraulic Controls for construction equipment have the same dependability which met the crucial test of battle in war machines on every front. These controls will take all the smashing, pounding shocks that construction equipment must withstand. They are simple, flexible, inherently self-lubricated, rarely need maintenance . . . assure immediate response to "finger-touch" on the operating lever, no matter how heavy the job.

Specify Vickers Power Hydraulic Controls . . . and get the most modern, fast-working construction equipment.

Representative Applications of Vickers Power Hydraulic Controls



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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

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*Are
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advantages
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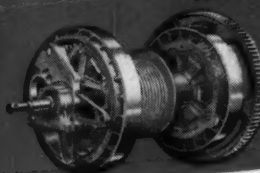
**NEW
SHOVELS
CRANES
and
DRAGLINES**
*you are
ordering?*

THE "FEATHER-TOUCH" CLUTCH CONTROL—



for easy operation
that keeps the
high output curve
up all day long.

THE CUSHION CLUTCH—



assures longer
cable life and
reduces strains
on all parts
under power
when overloads
come on.

THE HELICAL GEAR DRIVE—



smooth, quiet,
nothing to
stretch—the
highest possi-
ble type of
speed reducer.

THE UNIFORM PRESSURE SWING CLUTCH—



takes the jerks
and grabs out
of swinging—
means longer
life—fewer ad-
justments—no
inside or outside band
clutch can be a uniform
pressure clutch.

THE NORTHWEST DUAL INDEPENDENT CROWD—



an Independent Crowd
plus an additional force
for crowding that other
shovels waste—
handles harder
digging and more
yards per hour.

NORTHWEST CRAWLER—



no pockets to pack
dirt in under rollers.
Gears fully en-
closed. Differ-
ential steering
on all machines
1 yd. capacity
and larger.

BALL OR ROLLER BEARINGS—



on all high
speed shafts—
maximum trans-
mission of en-
gine power to
all operations.

**AND
MANY OTHER
NORTHWEST
FEATURES**

9 If you are buying a Northwest, of course, you are—these advantages and many more. If you are planning on the purchase of a shovel, crane, dragline or pull-shovel, go into it deeply. You'll want these features and the many other features that Northwest can bring you.

Check the companies that now own Northwests. Note how many of the nation's leading contractors practically standardize on Northwest. Note that every third Northwest sold is a repeat order—the best possible testimonial to service.

Northwests are money makers, with a long record for high output and low maintenance. Northwests bring you the kind of service you are looking for.

NORTHWEST ENGINEERING CO.
1726 Steger Bldg. • 28 E. Jackson Blvd.
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**EVERY
THIRD
NORTHWEST
SOLD IS A
REPEAT ORDER**

NORTHWEST
SHOVELS • • CRANES • • DRAGLINES • • PULLSHOVELS

Thermoid — Key to Progress in Many American Industries



The old method of getting bricks to the bricklayers has been superseded by the modern Thermoid Conveyor Belt



Here's the modern method. This Thermoid Belt was chosen because neither weather nor the sharp bricks will injure the belt

SINCE 1880, Thermoid has contributed to the progress of American Industry. In many fields of business Thermoid Products play an indispensable part. For instance, the George Haiss Manufacturing Company, manufacturers of portable conveying equipment, chose Thermoid Conveyor Belting for the portable brick conveyor shown above.

The Thermoid Line* is the result of 65 years of research and experience that not only has kept pace with the demands of industry, but in many cases anticipated industry's needs.

The Thermoid Line* of belting and hose for materials handling and power transmission may contain the key to another step forward in the improvement of your process and the reduction of your costs.—"It's Good Business to Do Business With Thermoid."

***THE THERMOID LINE INCLUDES:** Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Sheet Packings • Industrial Brake Linings and Friction Products • Molded Hard Rubber and Plastic Products.

Thermoid Rubber

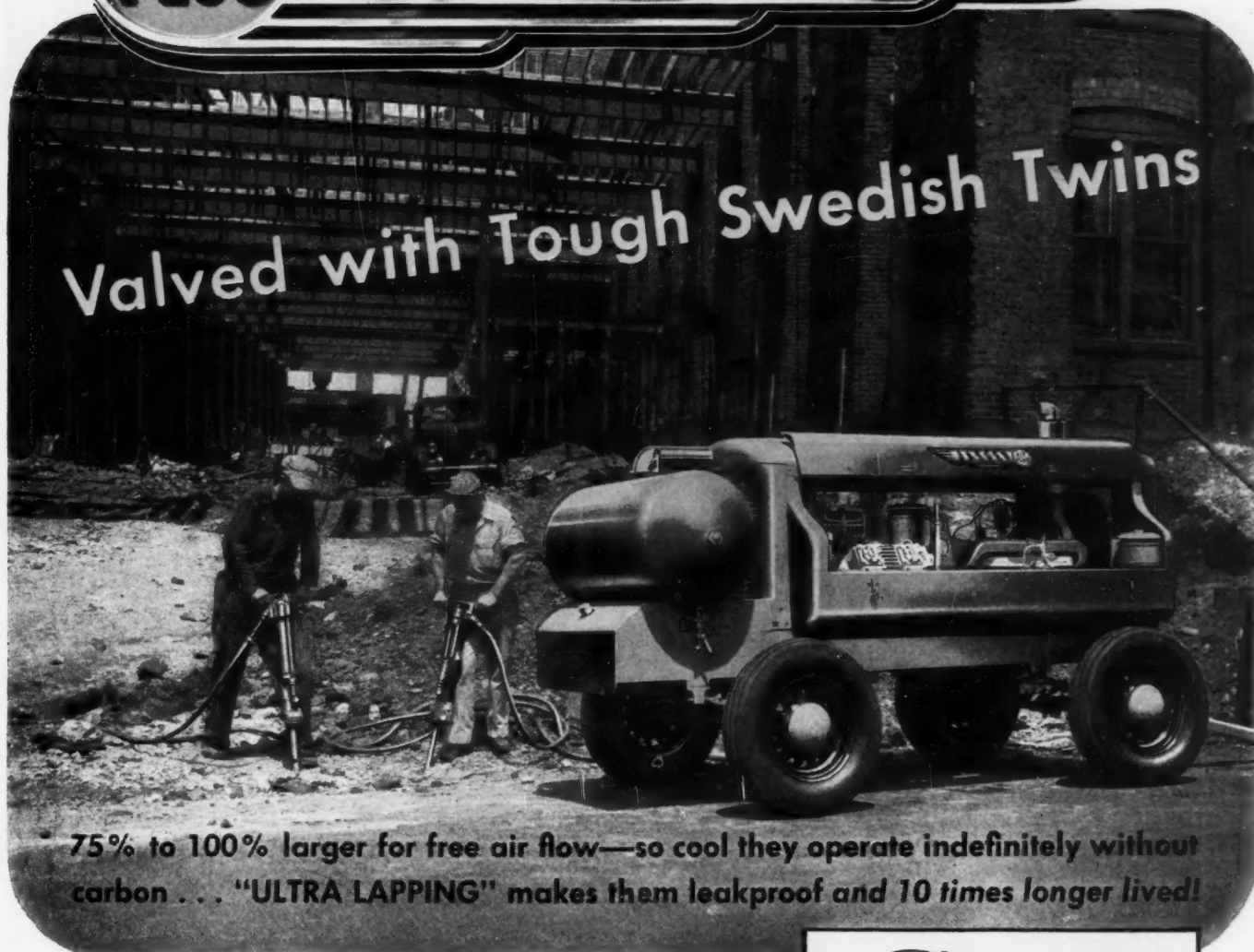
DIVISION OF THERMOID COMPANY
TRENTON 4, NEW JERSEY

Contributor to Industrial Advancement Since 1880

AIR PLUS

JAEGER COMPRESSOR

Valved with Tough Swedish Twins



75% to 100% larger for free air flow—so cool they operate indefinitely without carbon . . . "ULTRA LAPPING" makes them leakproof and 10 times longer lived!

The heart of every "AIR PLUS" Compressor is a set of Swedish Twins . . . steel chosen for its toughness and carefully hardened . . . "ultra lapped" by Jaeger's exclusive process to form perfect seating, leakproof valves and make them 10 times longer lived . . . doubled in size to let the air flow freely, eliminating heat, carbon and power-wasting back pressure, and to operate with lower lift and a resulting minimum of wear. Send for Catalog JC-5. It shows you why compressor users are demanding "AIR PLUS."



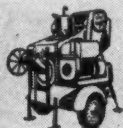
TOUGH SWEDISH TWINS

THE JAEGER MACHINE CO., Columbus 16, Ohio

REGIONAL OFFICES: 8 E. 48th St. NEW YORK 17, N. Y. 226 N. LaSalle St. CHICAGO 1, ILL. 235-38 Martin Bldg. BIRMINGHAM 1, ALA.



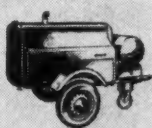
"FLEET-FOOT" LOADERS



"SPEEDLINE" MIXERS



"SURE-PRIME" PUMPS



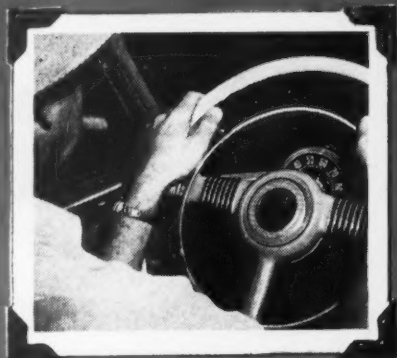
"AIR-PLUS" COMPRESSORS

JAEGER
Engineered EQUIPMENT

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

How we make good tires better!

(The 14-car Armstrong Tire Test Fleet drives almost 15,000 miles a day under all conditions so our three research laboratories can have accurate reports on Armstrong Tire performance. This is a brief picture story of the test fleet in action.)



*They drive at 60 m.p.h.
24 hours a day!*



*Drivers call the 340 mile
test course "The Devil's Causeway!"*



*Tires are purposely underinflated
—checked every 75 miles!*



*Cars carry 1000 pounds
dead load!*



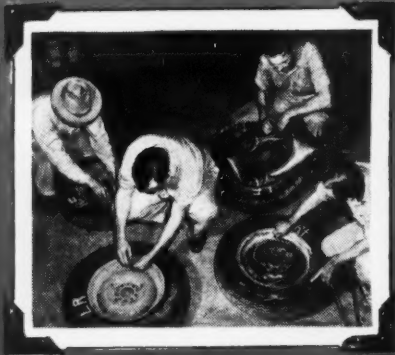
*Each car does more than 1000 miles
a day—days on end!*



*Sharp turns on gravel roads
at full speed!*



*Tread wear measured to 1000th
of an inch every 2000 miles!*



*Tires rotated on car
every 1000 miles!*

Wanted: Independents!

Independent tire operators are urged to write us immediately for "The Armstrong Plan"—a concise, to-the-point brochure outlining the profit possibilities and long range security provided by an Armstrong Tire franchise. It's free—write today to:

THE ARMSTRONG RUBBER COMPANY
460 Elm Street, West Haven 16, Conn.

ARMSTRONG TIRES

Makers of Quality Tires and Tubes since 1912

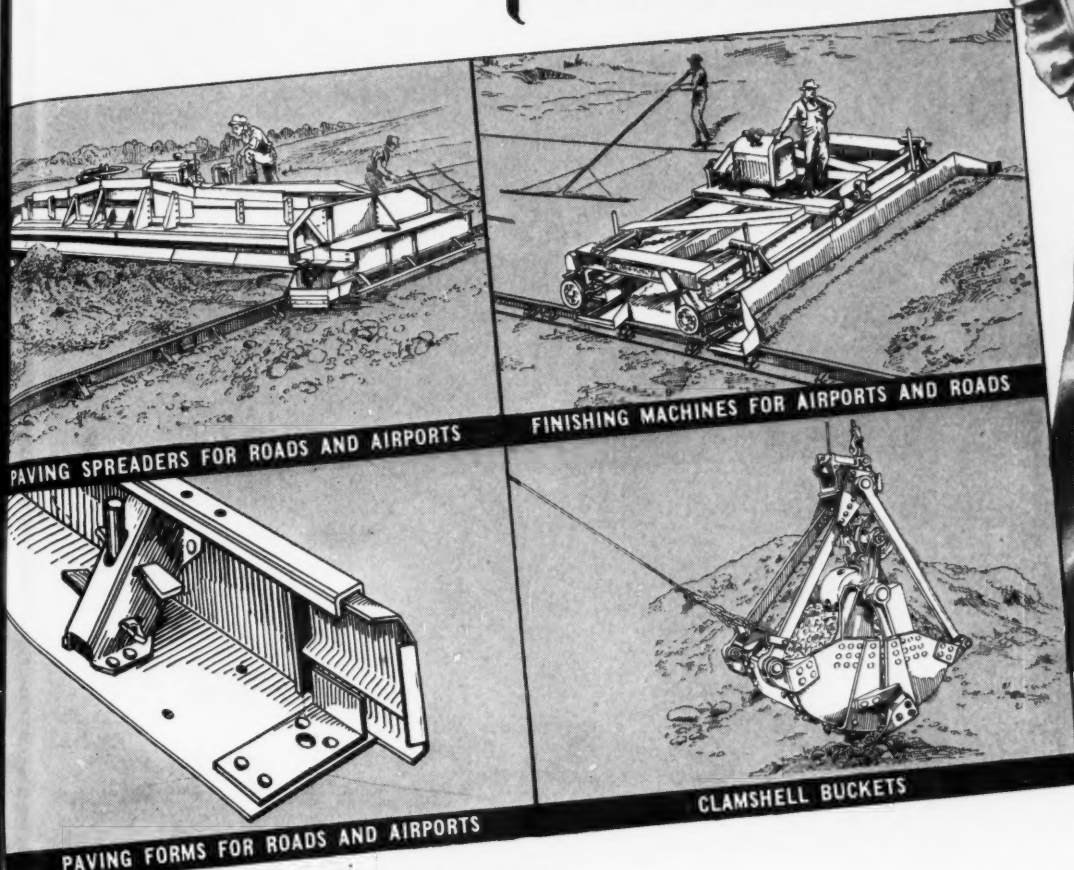
Plants: West Haven, Conn. • Natchez, Miss. • Des Moines, Iowa



BLUE RIBBON PERFORMANCE

MEANS

**Record Smashing Production
High Quality Performance
Lower Costs and Greater Earnings**

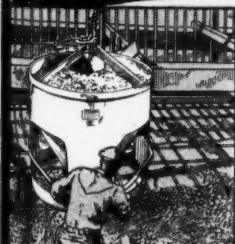


PAVING SPREADERS FOR ROADS AND AIRPORTS

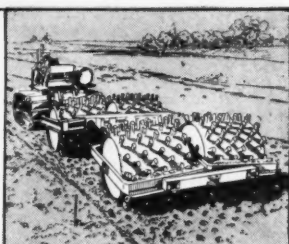
FINISHING MACHINES FOR AIRPORTS AND ROADS

PAVING FORMS FOR ROADS AND AIRPORTS

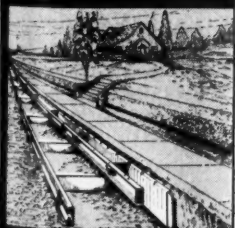
CLAMSHELL BUCKETS



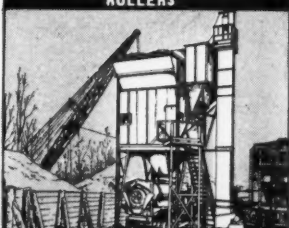
CONCRETE BUCKETS



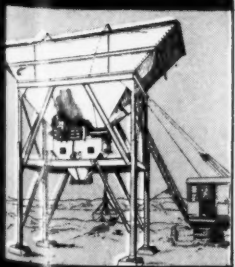
SHEEPSFOOT TAMPING
ROLLERS



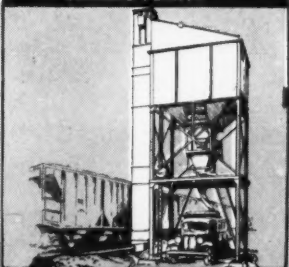
STEEL STREET FORMS



TRUCK MIXER
LOADING PLANTS



AGGREGATE
BATCHING PLANTS



BULK CEMENT PLANTS

Blaw-Knox Construction Equipment offers all three!

Where high speed construction is imperative, either to meet a tough schedule or to make up for unforeseen delays, you can bank on Blaw-Knox Equipment getting the job done quicker.

Where quality of work has to satisfy the requirements of rigid inspection, the Blaw-Knox equipped contractor can depend on his machinery.

Earlier completion and high quality performance through the use of Blaw-Knox Construction Equipment mean cost reduction and larger profits.

The features you are looking for — the factors that mean **Blue Ribbon Performance** — are built into Blaw-Knox batchers and forms, buckets, spreaders and finishers, etc. Experience of our armed forces overseas, and of contractors everywhere, bears this out.

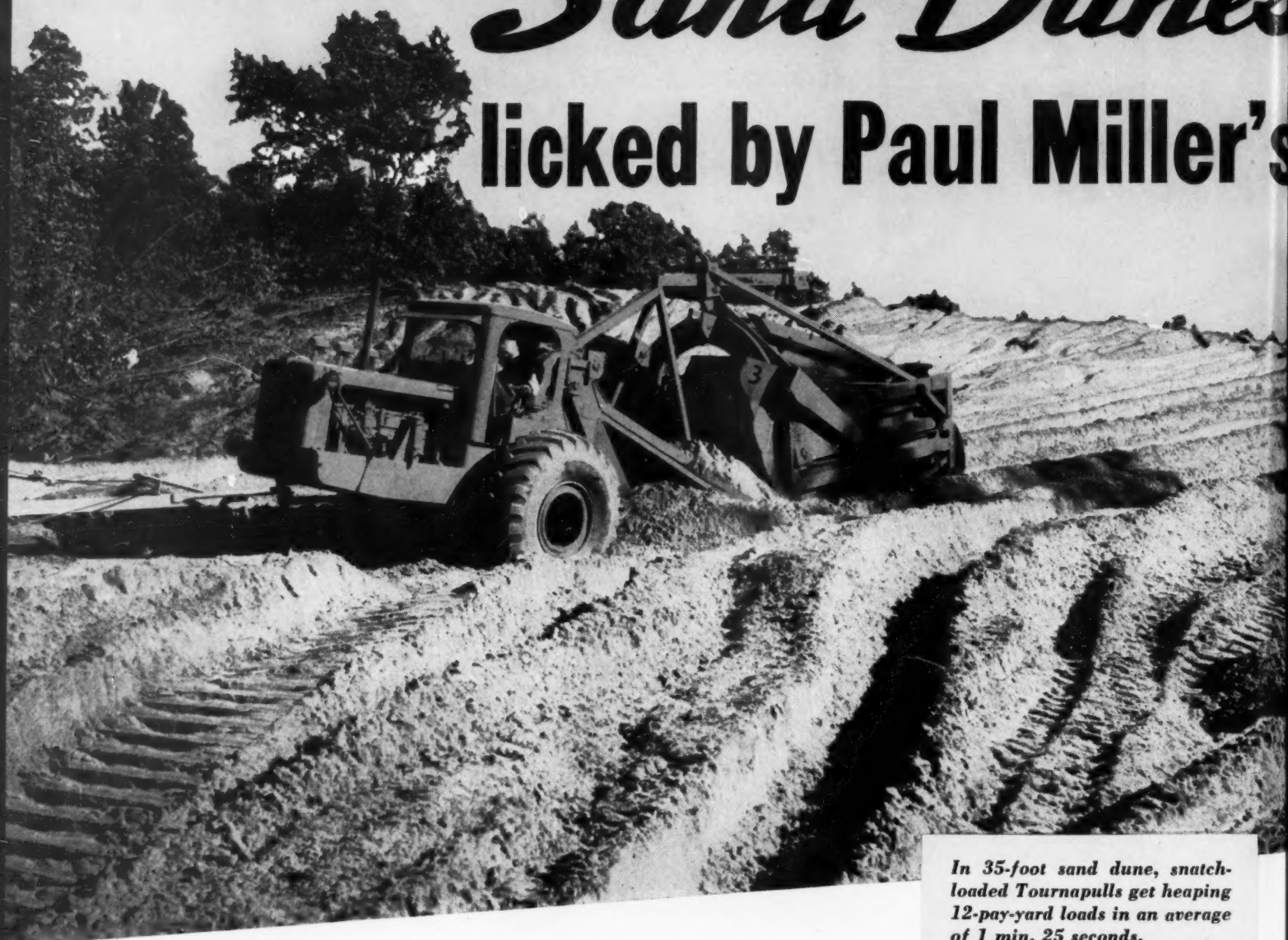
For details — photos — performance data, write for Bulletin No. 2036.

BLAW-KNOX DIVISION of Blaw-Knox Co.
2086 Farmers Bank Bldg. Pittsburgh 22, Pa.

BLAW-KNOX

CONSTRUCTION EQUIPMENT

Sand Dunes licked by Paul Miller's



In 35-foot sand dune, snatch-loaded Tournapulls get heaping 12-pay-yard loads in an average of 1 min. 25 seconds.

Actual load count over a 3-day period shows EACH TOURNAPULL DELIVERS 480 PAY YDS. EVERY 9 HRS. ON 4200' ONE-WAY HAUL

PROJECT—To move 225,000 cu. yds. for General Motors Diesel Division plant site, near Grand Rapids. Almost half the yardage — 100,000 cu. yds. — is abrasive, fine white sand, which had to be loaded out of a 35-foot-high sand dune . . . hauled 4200' through a thickly-wooded park area, where tree-cutting restrictions necessitated narrow, winding haul roads . . . and spread in 6-inch layers over soft, spongy muck on the fill.

METHOD—Paul Miller Construction Company put three Tournapulls to work on the dune loading out sand. Here's how: Working down a 15% grade, using a snatch tractor and pump-loading method, each rig obtained 12 pay yard loads in an average 1 min. 25 sec. Tournapull 2-wheel design, plus big rubber tires, provided ample power to pull through the soft, loose material in the cut, on the fill and return up a 10% grade to the top of the dune.

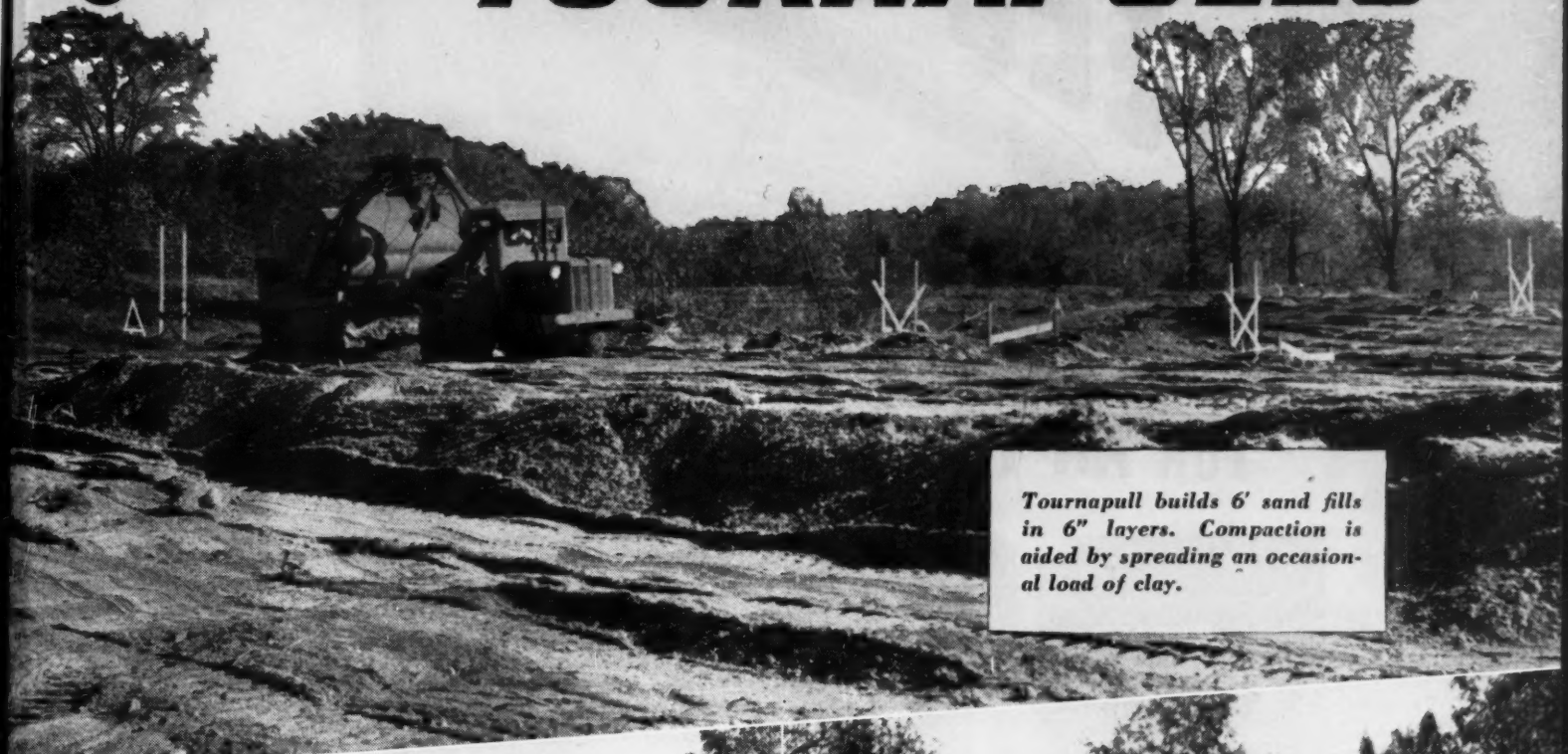
PRODUCTION—A 3-day time study showed that each Tournapull made an 8400-foot round trip every 13.5 minutes . . . averaged 480 pay yards per 9-hour day . . . thus, proving Tournapull's ability to handle tough materials, despite adverse job conditions.

EXTRA USES—In addition to the above production, the Tournapulls picked up an occasional load of clay and gravel at the fill and spread it on the haul road on return trips, to help keep roads in fast-travel condition. After completing the fill, Paul Miller plans to use his Tournapulls to replace top soil, level and spread gravel and surfacing material on parking lot areas, etc.

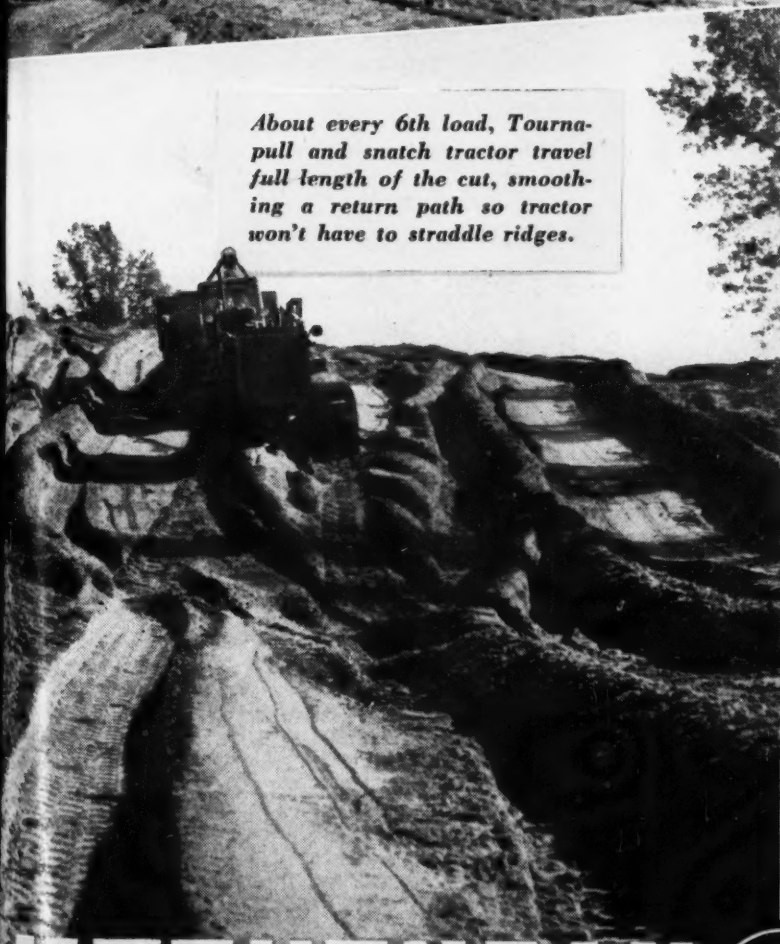
IT WILL PAY YOU to check Tournapulls lowest-net-cost-per-yard performance on your dirtmoving jobs. For job-proved facts and figures, see your LeTourneau distributor TODAY.

... of Michigan

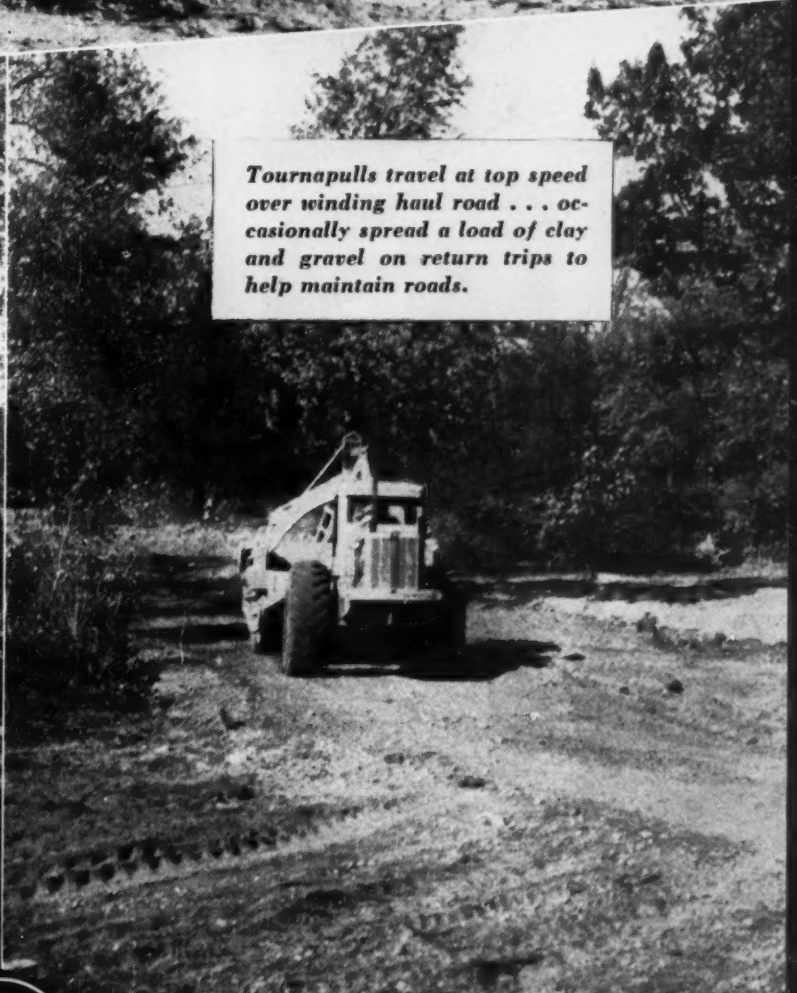
er's big-tired **TOURNAPULLS**



Tournapull builds 6' sand fills in 6" layers. Compaction is aided by spreading an occasional load of clay.



About every 6th load, Tournapull and snatch tractor travel full length of the cut, smoothing a return path so tractor won't have to straddle ridges.



Tournapulls travel at top speed over winding haul road . . . occasionally spread a load of clay and gravel on return trips to help maintain roads.

LETOURNEAU
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

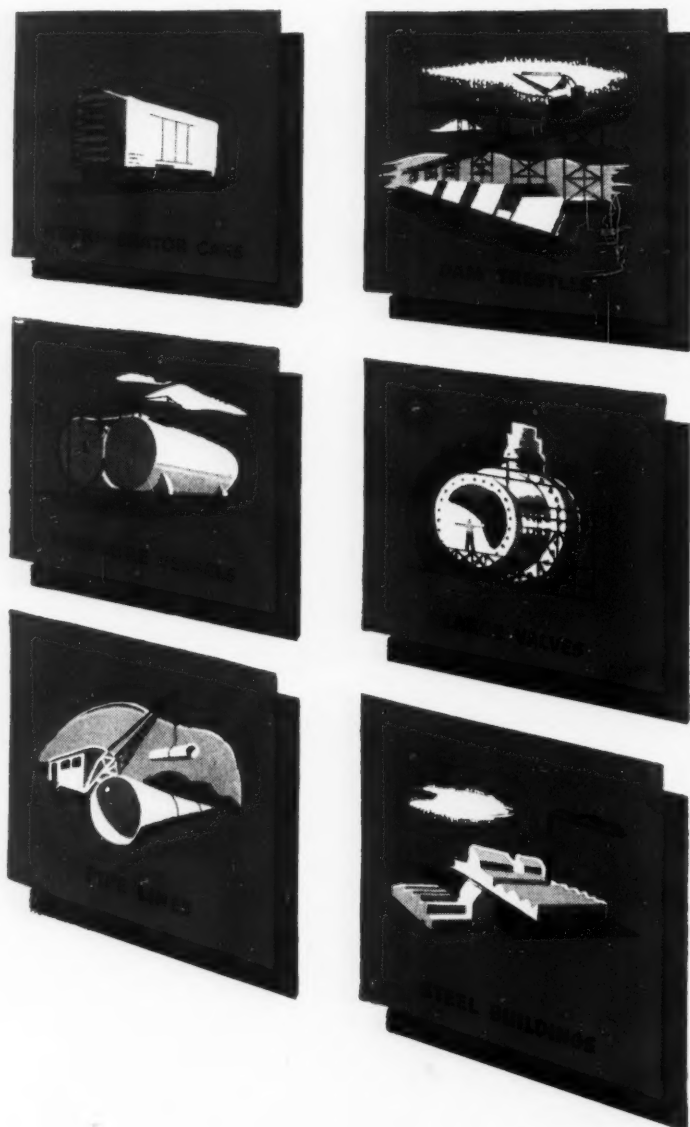
JOB-PROVED
Over 4000 Built and Shipped

TOURNAPULLS

Trade Mark Reg. U. S. Pat. Off.



FOR AN INDUSTRIAL WEST



An expanding western industry has many uses for steel. Six are presented here to show the diversity of Consolidated Steel's precision fabrication.

If your construction plans call for the use of steel—Consolidated Steel is ready to offer you capable, immediate service. Address Consolidated Steel, Los Angeles 22, California; or Orange, Texas.

Consolidated Steel



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INTERNATIONAL POWER Makes the Tough Jobs Pay...

● Let International TracTracTors tackle your tough earth-moving jobs. They offer you matchless performance, with unbeatable operating economy and minimum maintenance. Owners everywhere find Internationals profitable because they are designed to power a great variety of digging, lifting, carrying and hauling equipment at maximum capacities. Each International Crawler completely satisfies earth-moving, construction and excavating needs to which they are matched. Instant starting, *full Diesel* engines—of advanced design for great lugging ability—give Internationals the brute power required for this work.

See your International Industrial Power Distributor for TracTracTors, Wheel Tractors, Engines and allied equipment.

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Chicago 1, Illinois



INTERNATIONAL

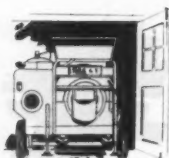
Industrial Power

*Something
New*

**IN
CONCRETE
MIXERS**

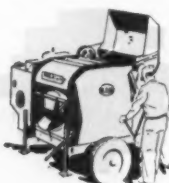


THE NEW Rex 6S MIXER



LOW OVERALL HEIGHT

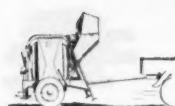
Compact, streamlined, the Rex 6S is years ahead of the field. Its low overall height... only 87 inches with skip up and 72½ inches with skip down... permits working in restricted spaces and allows plenty of headroom for parking in garage or other buildings. Legs telescope out of the way for towing, and are easily adjustable for stability when mixing.



MAXIMUM OPERATOR CONVENIENCE

Without moving, the operator can handle the skip clutch, brake, water valves and discharge controls. Controls swing through short arcs with little effort. Operator fatigue is minimized, assuring fast operation *at the day's end as well as at the start.*

EXCEPTIONAL PORTABILITY



The new Rex is so perfectly balanced that it can be lifted by one hand at the end of the tow pole. This balance, plus low center of gravity, assures fast, safe towing. Mixer does not weave when traveling. Hitch is easily made to get on or off the job fast. Tow pole is detached by simply removing a pin.

AND MANY OTHER FEATURES

The new Rex 6S has many other outstanding features. Accurate water system, semi-hydraulic push-pull water valve, fast, thorough mixing action, streamlined "shimmy-skip" with new cowl and wing plates, chain belt drive, outside pivoted discharge chute, and many others. For complete information, see your Rex Distributor or write for Catalog No. 480. Address Chain Belt Company, 1664 W. Bruce St., Milwaukee 4, Wisconsin.



CHAIN BELT COMPANY of MILWAUKEE

CONSTRUCTION MACHINERY



PUMPS



PAVERS



PUMPCRETES



MOTO-MIXERS



MIXERS

There IS a Reason

Gar Wood—World's Largest Manufacturer of Truck and Trailer equipment—earned this leadership through ability to engineer and build units of such outstanding performance that men who know equipment best specify Gar Wood.

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HOISTS • BODIES • WINCHES • CRANES • ROAD MACHINERY

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EASY ON UPKEEP...



*Structure, Bus Bars
and Fittings are all
Alcoa Aluminum*

Protection against the elements is built right into this outdoor substation. It's Alcoa Aluminum throughout. Needs no painting, ever, so you're spared that expense and hazard.

Alcoa Aluminum structural shapes are available in all forms required for such construction. They are assembled with aluminum bolts or rivets. Or they may be welded. Large, lightweight, shop-fabricated sections cut time and labor for

field erection of structures.

Alcoa Aluminum bus bars are available as flats, rounds, tubes, channels, and angles. Their lighter weight places less burden on supports, often permitting economies in construction.

For data on structural shapes and fastenings, bus bars and fittings, get in touch with the nearest Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 1865 Gulf Bldg., Pittsburgh 19, Penna.

ALCOA ALUMINUM

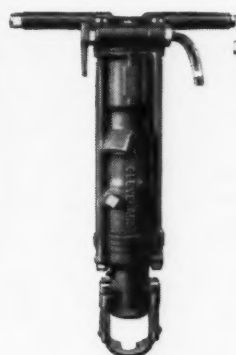


Cleveland Sinkers

PACK A MIGHTY WALLOP!

In addition to their remarkable power, Cleveland Sinkers are easily held and very economical in air consumption. Many sizes, in wet or dry construction, for fast drilling in every type of rock. Available with chucks for collared drill steel, and plain or lugged shanks. Drop forged construction insures super strength. End-seating valve (used on most models) improves with use, prevents greater air consumption as drill grows older. • Mountings available for Models H111 and H10 for conversion to drifter type drills, used on column arm or tripod. • Be sure to use these sinkers with the Cleveland Accessories shown here. *Remember, the most efficient rock drill delivers even better performance when equipped with the proper, high-quality accessories.*

Write for Bulletin 122 on Sinkers—Bulletin AC-11 on Accessories



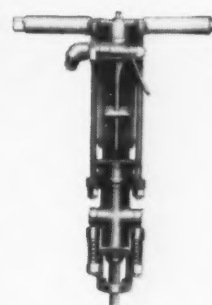
Model H23, 83 lbs.
For extra tough drilling.



Model H111, 55 lbs.
An all around favorite.



Model H10.
Leader in the 45 lb. class.



Model H66, 32 lbs.
Light but powerful.

FOR BEST RESULTS USE CLEVELAND ACCESSORIES



"Veribest" Air Hose is
extra tough, withstands
rough treatment.



Cleveland Air Filters prevent line trash from entering
your drill.



Cleveland Line Oiler keeps
drills amply lubricated and
working at top speed.



Hose Clamp Tool is handy
and efficient for securing wire
clamps to hose and fittings.



Type "A" Couplings are
made of a tough, rust-proof,
bronze alloy. Quick-acting.

LEADERS IN DRILLING EQUIPMENT

**CLEVELAND
ROCK DRILL DIVISION**
THE CLEVELAND PNEUMATIC TOOL CO.
CABLE ADDRESS: "ROCKDRILL"
CLEVELAND 5, OHIO

BRANCH OFFICES

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El Paso, Texas			Washington 5, D. C.

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Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.
Industrial Machinery Co., Ltd., 163 N. Water St., Halifax, Nova Scotia

Now Available... **McKIERNAN-TERRY** **SINGLE-ACTING PILE HAMMERS**

Supplementing the widely known line of McKiernan-Terry Double-Acting Pile Hammers designed to meet all conditions ordinarily encountered in pile driving, McKiernan-Terry has applied the experience of nearly fifty years to make available a standard line of Single-Acting Hammers, and for the past twelve years has been building Single-Acting Hammers for special projects.

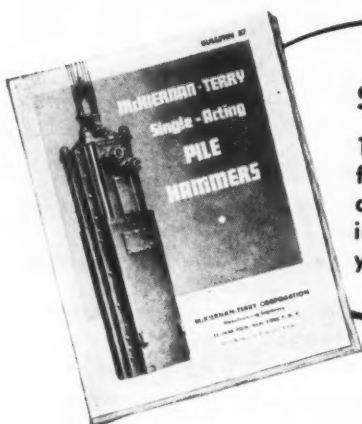
These hammers are best suited for driving through very dense substances like stiff blue clay, heavy "gumbo," incipient shale, hard pan or compacted gravel, and in driving heavy mass piles, such as pre-cast concrete, where lower velocity at point of impact is necessary to avoid undue strain on piling and ram.

Built of highest quality heat-treated alloy steel forgings and heat-treated alloy steel castings. Cast meehanite steam cylinders. Welded steel bottom cylinders. Piston and ram, heat-treated alloy steel forgings.

Completely enclosed—all working parts protected from sand, grit, foreign matter.

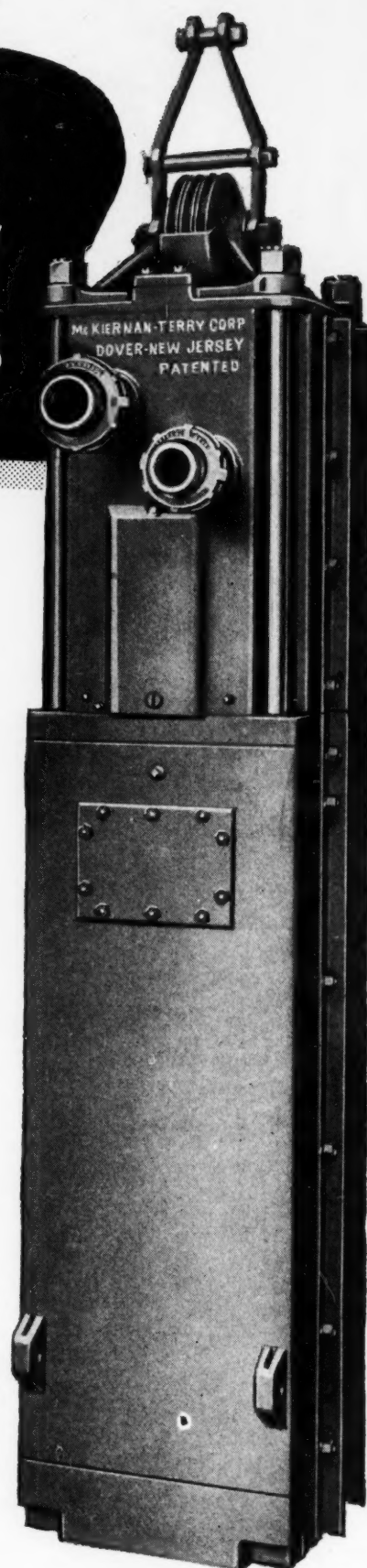
No exposed working parts—reducing hazards to workers.

Only single-acting hammers that can perform under-water work, making possible the use of shorter piles—saving labor, time, material.



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16 pages. Just off the press. Gives specifications, diagrams, operating details, concise tabulation of advantages appealing to engineers and contractors. Send for your free copy—ask for Bulletin No. 57



McKiernan-Terry **CORPORATION**

Manufacturing Engineers

14 PARK ROW

NEW YORK 7, N. Y.

**MORE POWER and
REAL
STRENGTH**

Here—



Mean Continuous Operation and Longer Life
on the job—

No Adnun Blacktop Paver was ever a "one-job" machine... some of the oldest models are still paving—and the new, faster and more powerful Adnuns are built to take the shocks and strains of high production paving without structural or power failures that hold up paving—make cheap equipment an expensive investment in the long run. Adnun construction puts strength where it is needed; in a heavy, cross-braced frame; provides insurance against out-of-line drive ele-

ments; and gives you the power to handle the heaviest trucks efficiently on any normal highway grades.

Adnun "Feathertouch" Hydraulic Controls, Power Cut-Off, Four-Wheel Drive, Continuous Course Correction, and versatility in paving to specifications under any job conditions are features that help to make long, dependable Adnun service *profitable* service for you.

There is a complete new catalog on Adnun Blacktop Pavers ready to be mailed at your request. Write for it today.

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1910 State Street • Nunda, N. Y.

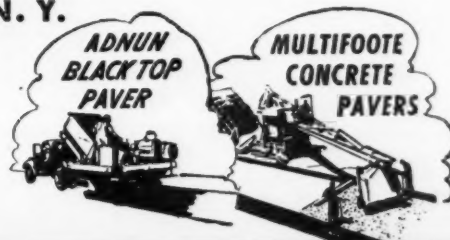
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Three Army-Navy "E" Awards for The Foote Company!



Base Your Bids on

CATERPILLAR

CABLE CONTROL

BAKER They go Together! AC

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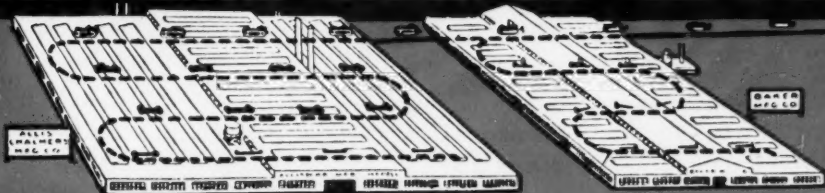
Baker Bulldozers

Yes, successful bidders today, as before, know that when it comes to turning out yardage it's Baker every time. Hard hitting, powerful, dependable — teamed with Allis-Chalmers Diesel tractors, they set the pace on any job. Baker 'dozers are built exclusively for A-C tractors—cooperatively engineered, designed, tested and produced by two great leaders in their respective fields. That is why there is no compromise in design—no unbalanced performance—no adaptations required. That is why there are more Baker 'dozers on Allis-Chalmers tractors than all other makes combined

THE BAKER MFG. CO., SPRINGFIELD, ILLINOIS

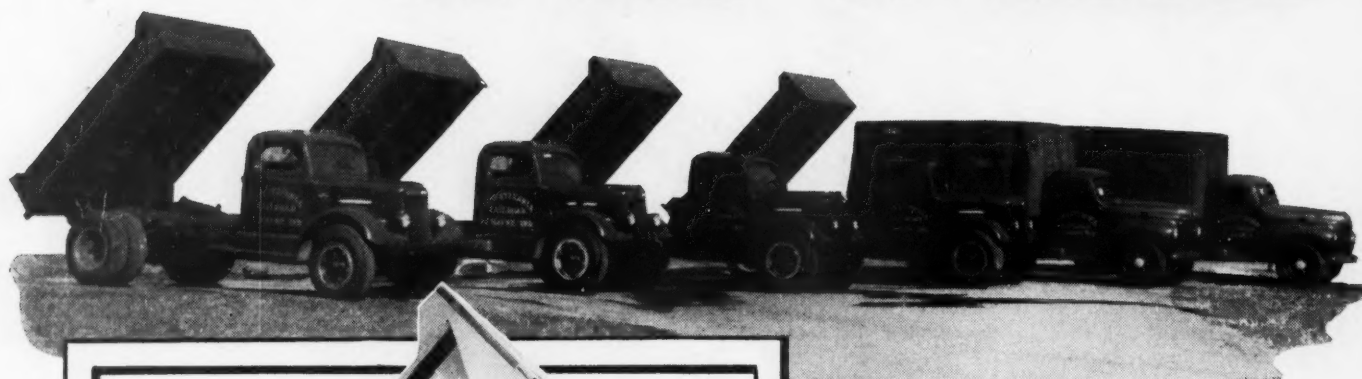


"STRAIGHT THROUGH" ASSEMBLY LINE — ALLIS-CHALMERS TO BAKER TO YOU!



The modern Baker plant with its completely equipped fabricating, machining and blacksmithing shops adjoins the Allis-Chalmers crawler tractor plant. When you order an A-C tractor with Baker bulldozer or gradebuilder, your tractor leaves the A-C assembly line, crosses a narrow court and goes on the Baker final assembly line.

NO BED OF ROSES



Hercules WD-12 heavy duty dump body, with pyramid type steel side braces and heavy boxed corners. This unit, of four cubic yard capacity, is equipped with a Hercules 8X Hoist.

There's a long, rugged life ahead of these new Hercules units . . . long hours and punishing service under the most difficult operating conditions. That's what railroad construction and maintenance of way work means . . . constant, driving work, day after day, with every job marked "Rush". But these heavy duty bodies and hoists will measure up to the task because each unit is designed and built for the toughest kind of service. All the jobs, under any conditions, will be finished on time and right.

Whether your haulage work is as difficult as this or not, it's nice to know that your equipment, built by Hercules, will deliver a full measure of satisfactory, low-cost service every day. Whatever your haulage problem, there's a Hercules unit built to help you get the work done in less time and at lower cost. Write today for complete information.

Address inquiries to Dept. B

HERCULES

DUMP BODIES AND HYDRAULIC HOISTS
SPLIT SHAFT POWER TAKE-OFFS • COAL CONVEYORS



**ONLY HERCULES
HAS ALL THESE FEATURES**

Center-Lift Hoist • Reversible Tailgate Hardware • Piston-Type Control Valve Hoist Mounts Above Frame • Easy-Reach Tailgate Lever • Accessible Hoist Cylinder Dash Controls for Hoist and Take-Off Patented Tire and Tool Pack

HERCULES STEEL PRODUCTS COMPANY . . . GALION, OHIO

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A MOUTHFUL AT EVERY BITE

EXCLUSIVE FEATURES

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**SUPERIOR
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in excavating

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The OWEN BUCKET Co.

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BUCKETS

For Money In Your Pocket PERFORMANCE

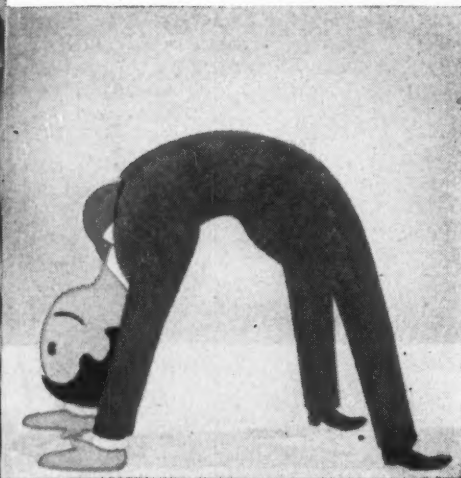
Resists Kinking

Being free from internal stress, it is always easy to handle—never fights back.



Spools Better

Even with a light load, it spools uniformly—is never cranky.



Takes Reverse Bends

Takes this "fatigue" much better, as on rope-ruining elevator installations.



Safer to Handle

Worn union-formed ropes handle as safely as new, as broken outer wires lie close to rope.

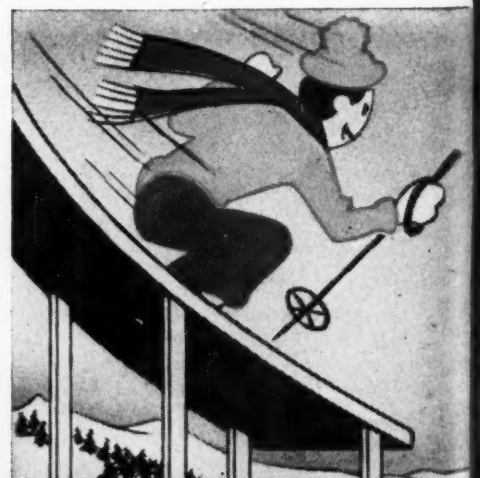
Always Relaxed

While it is flexible, and pliant, it has the "toughness" to withstand strain and weight.



Behaves on Grooves

Resists rotating or twisting in sheave grooves because wires are Preformed.



Specify



union-formed (preformed)

THE ULTIMATE IN LOW COST WIRE ROPE

**Precision Constructed
to OUTPERFORM
ordinary Wire Rope**

FIGHT! FIGHT! There is an exhausting fight going on all the time in ordinary wire rope. Each wire is fighting constantly to get out of the fixed position into which it is forced without any preliminary training to put it in shape. This internal fighting spoils the performance, cuts it short, doesn't give you a run for your money.

In **union-formed** Wire Rope each wire is put in shape (*Preformed*) before it ever touches another wire in the rope. The result is exactly the same that comes from a set of conditioned muscles, i. e. finer coordination, greater endurance, top-flight kind of performance that does not let you feel out-of-pocket.

Yes sir! You will always get the most out of the best. The little extra you invest for the best is the part of your investment which will bring the pay-off—yield the most dividends. Prove this fact to your own satisfaction. **Specify union-formed**—get money-in-your-pocket performance.



union Wire Rope

UNION WIRE ROPE CORPORATION

2174 Manchester Avenue Kansas City 3, Missouri
Tulsa 3 Houston 11 Chicago 6 Salt Lake City 13 New Orleans 16
Monahans, Tex. Portland 10, Ore. Ashland, Ky. Atlanta 1

NEW CHALLENGE Confronts Road Builders

The first challenge came in 1919—first full year after first World War.

That year Americans en masse decided that the automobile was more than a pleasure vehicle—that it was a necessity—the means of transporting them to horizons of greater freedom.

That year we had 6 million automobiles—virtually no surfaced roads. Oregon passed the first gasoline tax law. The Federal Government paid out nearly 3 million dollars to help pay for state road systems.

All states acquired highway departments and passed gasoline tax laws. Planned road building got under way. Road builders met the challenge—got us out of the mud. In ten years we had 23 million motor cars—the life of Americans was transformed—became mobile.

Then, in a 7-year period more than a half billion dollars of state highway funds were diverted for such things as the dole—enough to build 20,000 miles of highway.

New construction was cut deeply. Stymied highway departments lost initiative. Shrunk road building organizations were further drained by the draft and war traffic took a terrific road toll.

But not until war stopped production, did people stop buying cars to boost the total to 33 million.

The first full year after World War II finds us with three-fourths of our roads alternately dust or mud, while in urban areas we're driving bumper to bumper at a pace not much faster than in the old horse and buggy days.

Up To Road Builders To Start One of Nation's Largest Industries On The Move Again

A half billion round Federal dollars are earmarked but can't roll into roads until State, County and Municipal plans are completed and legislative bodies vote matching funds.

Every American has a stake in road building. A seventh of all workers have a big stake because their livelihood depends upon it.

All America now looks to State, County and Municipal highway and street departments to enlarge their professional organizations to speed up plans; to legislative bodies to provide undivertable revenue to match Federal funds; to the raw materials producers to expand output; to the makers of machinery for more and better equipment and to the road contractors to mobilize greater forces and efficient equipment.

This Is The Challenge of 1946. To meet it calls for the **Active Cooperation** of every profession and industry having a part in road building. Let's meet that challenge head on.

Keeps Metal PASSIVE

...another Plus that adds

to **RED LEAD'S** Extra Rust Protection...

There is no question about Red Lead's acceptance throughout industry as the standard priming paint for making metal *LAST*.

One important reason is its ability to keep metal surfaces in a "passive" or rust-inhibiting state. Authorities agree that metal protective paint should be rust-inhibitive to give satisfactory performance.

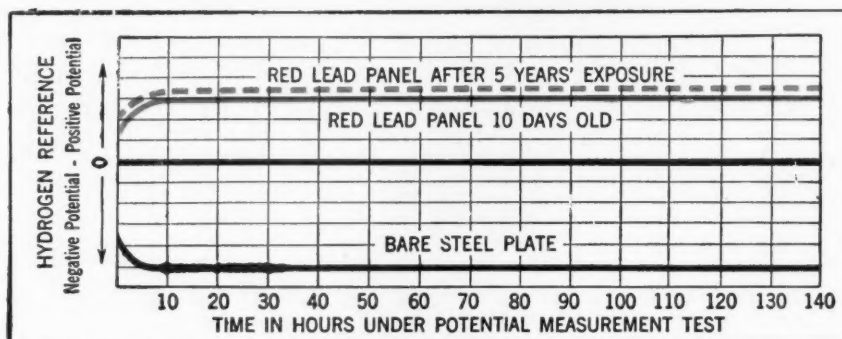
Time-potential curves, such as the one at right, are used to express rust-inhibitive properties of paint and thus indicate its effectiveness of protection. They show the effect of Red Lead on the potential of steel in the presence of moisture or water.

For example, a steel panel whose potential is *positive*, relative to hydrogen, is considered to be in a passive or non-corroding state. A negative potential indicates corrosion activity or rusting. The graph shows clearly the rust-inhibitive effect of Red Lead paint on steel as contrasted with the rapid and continuous rusting of unpainted steel.

Note that in this test a Red Lead paint film which had weathered 5 years was just as effective in preventing rust as one which had dried for only 10 days.

Specify RED LEAD for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better metal paint if it contains Red Lead.



*Proof That Red Lead Keeps Metal Passive

In the above test a piece of unpainted steel was immersed in water. Iron, going into solution, reacted with oxygen in the water to form rust. This unrestrained corroding state is indicated by a rapidly developed and maintained negative potential (see above graph). However, when steel panels painted with Red Lead were immersed un-

der the same conditions, ferric and lead salts formed directly next to the metal. This action at once stifled corrosion by preventing the iron from going into solution, thus keeping the steel surface passive. The result is shown in the graph curves above, where a quickly rising positive potential remains constant throughout the test.

Write for New Booklet—"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas... ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed at right.

All types of metal-protective paints are constantly being tested under all conditions at National Lead's many proving grounds. The benefit of our extensive experience with Red

Lead paints for both underwater and atmospheric use is available through our technical staff.



NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna.); Philadelphia 7 (John T. Lewis & Bros. Co.); Charleston 25, W. Va. (Evans Lead Division).

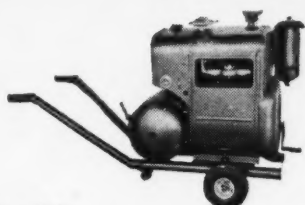
DUTCH BOY RED LEAD

*Run your eye over this wide
range of*

SCHRAMM

AIR COMPRESSORS

SIZES FROM 20 TO 420 CU. FT. ACTUAL AIR



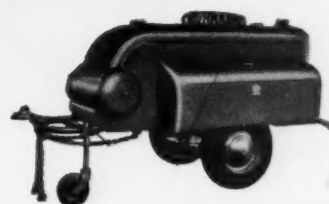
**No. 20
ON SHOP TRUCK**

The No. 20 compressor is a complete self-contained unit available in various types of mountings and with an actual air delivery of 20 cu. ft. per minute.



**60 CU. FT.
DE LUXE WITH TOOL BOXES**

The two wheel trailer type mounting is designed for rapid and inexpensive transportation behind truck or car.



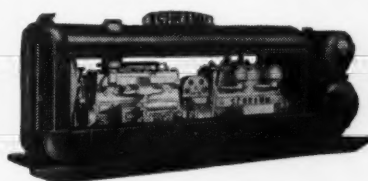
**105 CU. FT.
WITH SWIVEL TYPE WHEEL**

This trailer type mounting is provided with a universal coupling or towing ring for connection to car or truck for hauling at maximum towing speed.



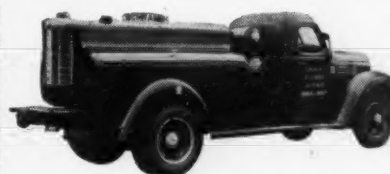
**105 CU. FT. WITH STREAMLINE
FUEL TANK**

A pneumatic tired mounting used generally for rapid transit over town and country highways. Lighter weight and better balance provide easier handling.



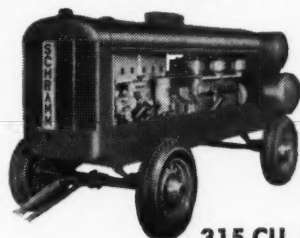
**210 CU. FT.
STANDARD SKID MOUNTED**

This unit is easily loaded on to a motor truck body for temporary use or for transportation, and can also be used for temporary or permanent stationary installation without addition of foundation.



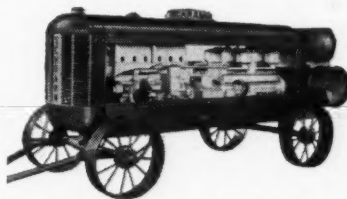
**210 CU. FT.
MOTOR TRUCK MOUNTING**

Any of the Standard self-aligned Schramm compressor units complete with streamline tool box and built-in fenders are available for mounting on truck chassis.



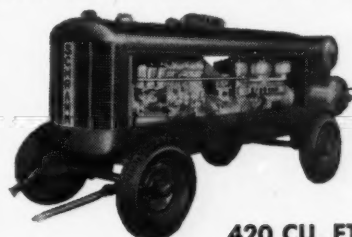
**315 CU. FT.
ON SPRING TRAILER**

The Spring Trailer, with pneumatic tires and semi-elliptical springs front and rear, is equipped with an automotive type steering assembly to provide perfect balance on any and all turns.



STEEL WHEEL MOUNTING

All size Schramm compressors are available in this type mounting with heavy, wide steel rims for easy portability in tough terrain.



**420 CU. FT.
DIESEL ENGINE DRIVEN**

Schramm Diesel Engine Driven units are available in sizes ranging from 105 to 420 cu. ft. of free air.

SCHRAMM INC.

**COMPRESSOR SPECIALISTS
WEST CHESTER
PENNSYLVANIA**

Get more power f



U. S. Army Air Forces Photo



TEXACO

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHTS ME T

Page 34 — CONSTRUCTION METHODS — January 1946



from your engines

Use this....

**DETERGENT
DISPERSIVE
...Oil**

FOR efficient performance under all conditions, from tropic heat to arctic cold, heavy-duty gasoline and Diesel engines need an oil that keeps engine parts clean, rings free, assures better compression, better combustion. *Texaco Ursa Oil X*** fills the bill precisely. It's both detergent and dispersive. It assures full power output, with greater fuel economy.

The properties of detergency and dispersion in *Ursa X*** play a major part in producing these benefits. Detergency keeps your engine clean. Dispersion holds deposit-forming materials in suspension until drained. In addition, *Texaco*

*Ursa Oil X*** has properties that protect bearings against corrosion, prevent scuffing of rings, pistons and cylinders.

For effective lubrication of air compressors, use *Texaco Alcaid, Algol or Ursa Oil*. You'll assure wide-opening, tight-shutting valves, eliminate ring-sticking, reduce repair and replacement bills—get better performance at lower cost.

Put your lubricating problems up to *Texaco Lubrication Engineering Service*. Call the nearest of the more than 2300 *Texaco* distributing plants in the 48 States, or write: The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

RIGHTS METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS



"Revive" Failing Sewers THIS EASY, PERMANENT WAY

Relining failed sewers is easy and quick
—and permanent—with long lengths of
sturdy ARMCO Asbestos-Bonded Pipe.

★ ★ ★

You can give failing sewers many more years of useful life by relining with durable, easy-to-install ARMCO Asbestos-Bonded Pipe. Job costs are low and the work moves fast. Long lengths of pipe, quickly joined with special inside band couplers, speed the job. Waterway is reduced a minimum because of the relatively thin walls of the corrugated pipe. Fast as the work goes, you build for *permanence*. Flexible corrugated

metal outlaws breakage. Corrosion is shackled by a full bituminous coating tightly bonded to the base metal. A thick bituminous pavement checks erosive action of sewage; makes the bottom last as long as the top.

Use ARMCO Asbestos-Bonded Sewer Pipe for essential repairs and include it in plans for new sewers. That way you build "for keeps"—provide your community with efficient, lasting, trouble-free sewer-

age. Our 48-page ARMCO Sewer Booklet will help you in your planning. Just write to Armco Drainage & Metal Products, Inc., and Associated Companies, 125 Curtis Street, Middletown, Ohio.



ASBESTOS-BONDED ARMCO SEWER PIPE

EXTRA ENDURANCE

*For the
Hard Pull!*

When the next-to-impossible Wire Rope job comes up ... one that requires the utmost in strength and ENDURANCE, just call in "HERCULES" (Red Strand) ... for here is a Wire Rope that through the years has proved its 'extra' endurance every time it has been put to work.



PIONEERING in heavy duty performance on tough wire rope jobs, "HERCULES" (Red Strand) has been adopted in one industry after another. That's why we say ... for that *extra* endurance, flexibility, strength, elasticity and adaptability, *always specify* "HERCULES" (Red Strand), and you'll come in first with the job well done.

Made in Round Strand and Flattened Strand constructions ... Preformed or Non-preformed—there's a type and construction to meet *any* heavy duty demand.

Consult our Engineering Department on *your* Wire Rope requirements—they'll be glad to work with you.

MADE ONLY BY

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS
5909 KENNERLY AVENUE

NEW YORK 6 • • • 90 West Street
CHICAGO 7 • • • 810 W. Washington Blvd.
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ESTABLISHED 1857
ST. LOUIS 12, MISSOURI, U. S. A.

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PORTLAND 9 • • • 914 N. W. 14th Avenue
SEATTLE 4 • • • 3410 First Avenue South



hether it's ...

- ✓ The matchless performance of All-Wheel Drive and All-Wheel Steer in a Power Grader ...
 - ✓ Vibrationless operation in a Road Roller ...
 - ✓ The "no conveyor" feature in a Street Sweeper ...
 - ✓ $\frac{3}{4}$ -swing for greater work output in a Crawler Shovel ...
 - ✓ Deeper jaws and higher operating speeds, for greater capacity in a Jaw Crusher ...
- ... whether it's one of these things, or something else, you can buy any Austin-Western product with confidence that it will OUTPERFORM in ways that mean more work and better work—faster and cheaper.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.

Built to Cuthbertson

BUILDERS OF

ROAD MACHINERY

Austin



Western

SINCE

1859

The Tougher the Job..

THE GREATER THE NEED FOR

Firestone

OFF-THE-HIGHWAY TIRES



THE cord bodies of the Firestone Rock Grip Excavator, the All Non-Skid Earth Mover and the Ground Grip Heavy Duty tires are made of highest quality rayon. The rayon plies are Gum-Dipped, a patented Firestone process, which increases their durability. Four additional tread plies cushion and absorb impact blows. Sidewalls are built double thick to protect against rutwear and snags. The tread rubber is extra tough—cut-resistant.

These facts explain the performance record of Firestone Off-the-Highway tires. You need tires that can take grueling punishment and stay on the job — minimizing time-consuming, costly delays. Put Firestone tires on your Off-the-Highway Equipment.

Listen to the "Voice of Firestone" every Monday evening



ROCK GRIP

ALL NON-SKID

GROUND GRIP

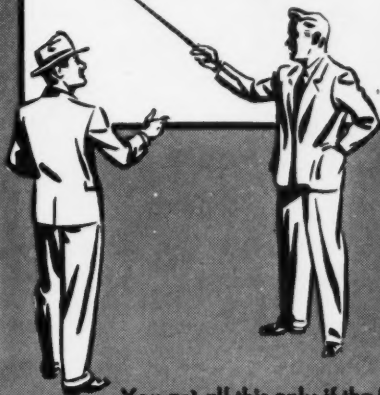
Copyright, 1946, The Firestone Tire & Rubber Co.

GOOD FUEL INJECTION

Fits the Engine

GOOD FUEL INJECTION PROVIDES:

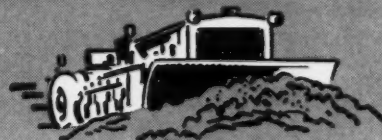
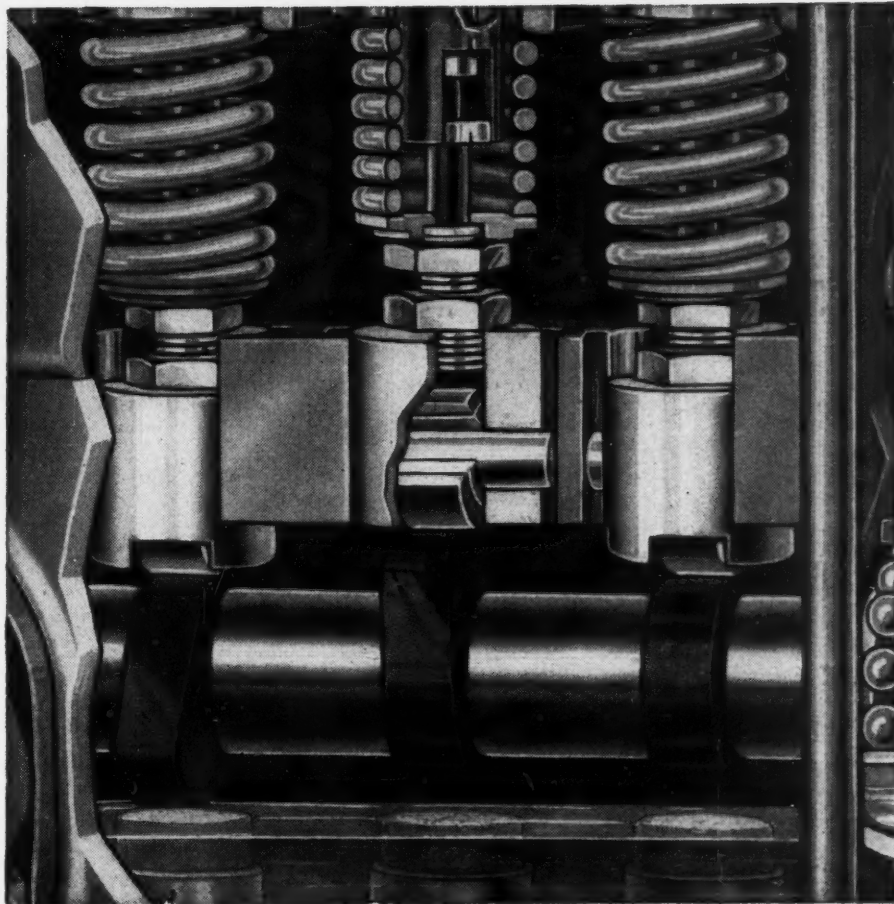
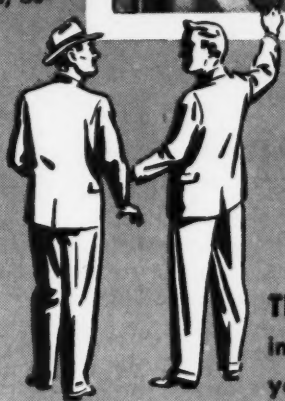
- A. Accurate Metering
- B. Precise Timing
- C. The Correct Duration
- D. A Spray Pattern Tailored to the Combustion Chamber



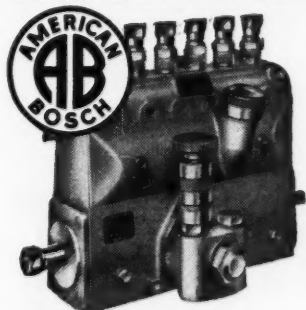
You get all this only if the fuel injection system has been engineered to fit the engine.

There are types of American Bosch injection equipment to suit all types of engines. The final engineering touches that make the equipment really fit involve the specially-designed or selected parts such as cams, plungers, delivery valves and nozzles.

THESE CAMS in the fuel pump, for example, are vital. They contribute importantly to control of the rate and duration of injection. They are engineered to co-operate smoothly with other elements of the fuel injection system to produce precisely the type of spray called for by the engine design.



THEY CAN TAKE IT. If your engine has American Bosch injection equipment — the kind that is engineered to fit — you can be sure that it will perform to its very best in giving you economical service under any and all conditions.

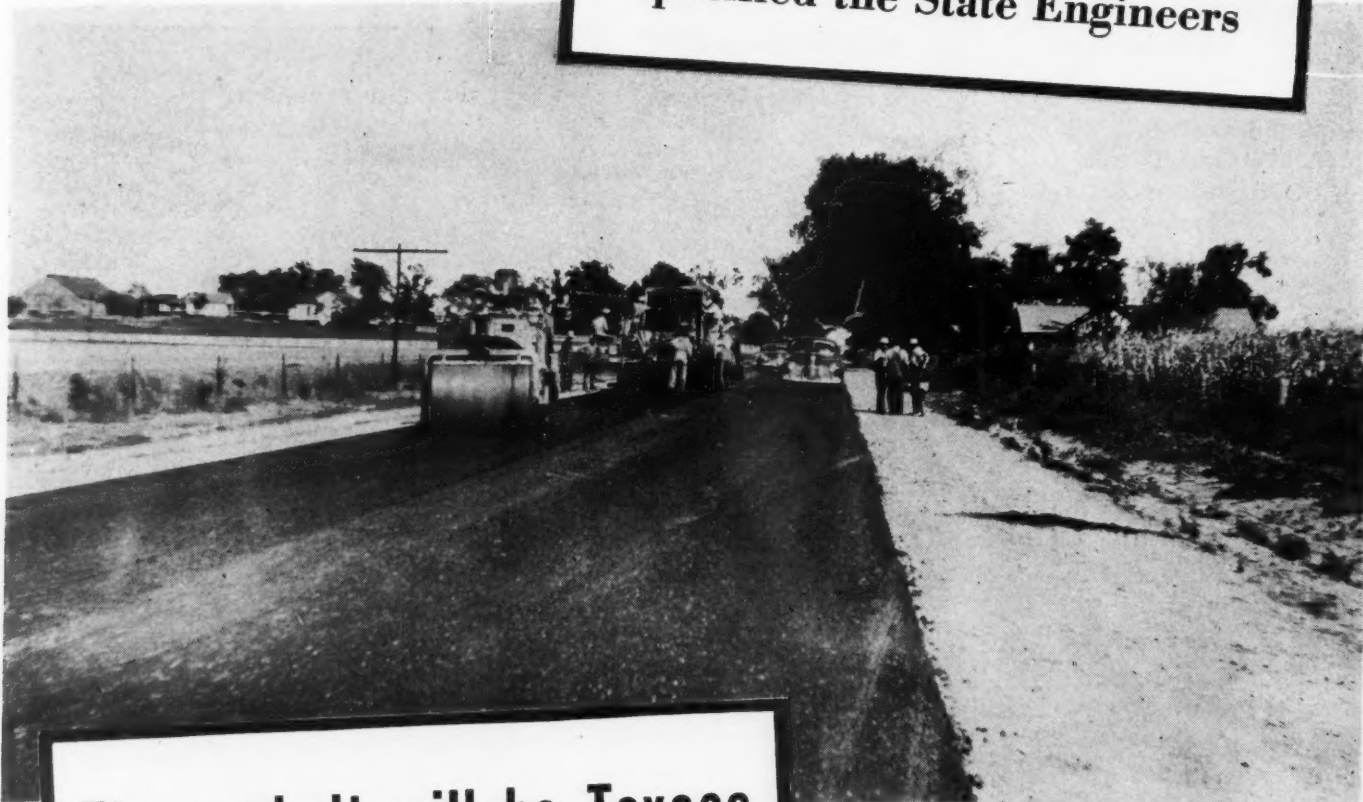


AMERICAN BOSCH CORPORATION, SPRINGFIELD 7, MASS.

AMERICAN BOSCH

Diesel Fuel Injection

**The pavement will be Asphalt
specified the State Engineers**



**The asphalt will be Texaco
decided the Contractor**

Constructing three inches of dense-graded Texaco Asphaltic Concrete paving on State Highway No. 145 in Massac and Johnson Counties, Ill. The Charles G. Gilmore Asphalt Products Company of Anna, Ill. was the contractor.

That combination of decisions resulted in the construction of a 3-inch plant-mixed Texaco Asphalt pavement on this State Highway in southern Illinois.

The same combination of decisions has been made on one highway project after another these past 40 years, with the result that thousands of miles of America's highways have been Texaco-paved.

Texaco Asphaltic products are indeed "old stand-bys" of U. S. road builders. They have played an important part in the good roads movement in this country since the horse and buggy days. Texaco Asphalt Cements, Cutback Asphalts and Emulsified Asphalts will play an equally useful role in the big post-war highway program ahead.

Texaco Engineers, who are Asphalt specialists, are always at your service. If you would like to discuss a highway construction or maintenance problem with them, write our nearest office.



THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd Street, New York City 17
Boston 16 Chicago 4 Denver 1 Houston 1 Jacksonville 2 Philadelphia 2 Richmond 19

TEXACO ASPHALT

You can BID LOWER
And Still Make MORE MONEY

with TIME-SAVING

SKILSAW!

With SKILSAW as your helper you can bid every job lower... handle more jobs faster... cut costs on every cut in wood, metal, stone and compositions... make more profit on every job. Remember that one SKILSAW does the work of 10 handsaws... quickly pays for itself, then goes on making money for you for years. Ask your distributor today for a demonstration on your own work.



SKILSAW, INC. 5033-43 Elston Ave., Chicago 30, Ill.
Factory Branches in All Principal Cities

PORTABLE ELECTRIC
SKILTOOLS

MADE BY SKILSAW, INC.



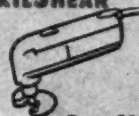
SKILSAWS



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SKILGRINDERS



SKILDRILLS



A FINANCING PLAN THAT *helps* CONTRACTORS TO BUY CONSTRUCTION EQUIPMENT

SHOVELS
TRACTORS
BULLDOZERS
COMPRESSORS
MIXERS
AND ALMOST EVERY TYPE
OF CONSTRUCTION EQUIPMENT

CRANES & DRAGLINES
SCRAPERS
ROLLERS
ENGINES
MOTORS

CONTRACTORS: When you need construction equipment here's a simple, **LOW COST** method of financing that makes it easy for you to buy whatever is required.

LET C.I.T. FINANCE YOUR PURCHASES: Be ready to bid successfully on the projects available. If you can increase your profits by owning the proper equipment, C.I.T. can help you acquire it.

There are no long, drawn-out negotiations. Tell us what you want to buy and we'll handle every detail promptly or, ask your distributor to arrange C.I.T. financing. We'll be happy to serve you and him.

HERE ARE THE PRACTICAL FEATURES
IMMEDIATE CASH to complete purchases of machinery, equipment, gear, engines.

TAKE MANY MONTHS to amortize the investment and let the equipment help pay for itself.

COMBINE SEVERAL PURCHASES, if desired, in one obligation.

CONSERVE your own working capital for payrolls, taxes, supplies, other expenses.

ANY AMOUNT, available promptly, **LOW COST**.



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CANADIAN ACCEPTANCE CORPORATION Limited
Metropolitan Building, Toronto

AFFILIATED WITH COMMERCIAL INVESTMENT TRUST INCORPORATED

Now in 33 States

Athey Force-Feed Loaders

Athey Force-Feed Loaders are now at work in 33 States! Introduced at the outbreak of the War, production of this self-propelled highway maintenance loader was curtailed for essential military needs. Rolling off the line again, the Athey Loader has met enthusiastic praise from states, counties, cities and highway contractors from coast to coast. Your Athey-"Caterpillar" Dealer has complete facts — ask him today. ATHEY PRODUCTS CORPORATION, 5631 West 65th Street, Chicago 38, Illinois.

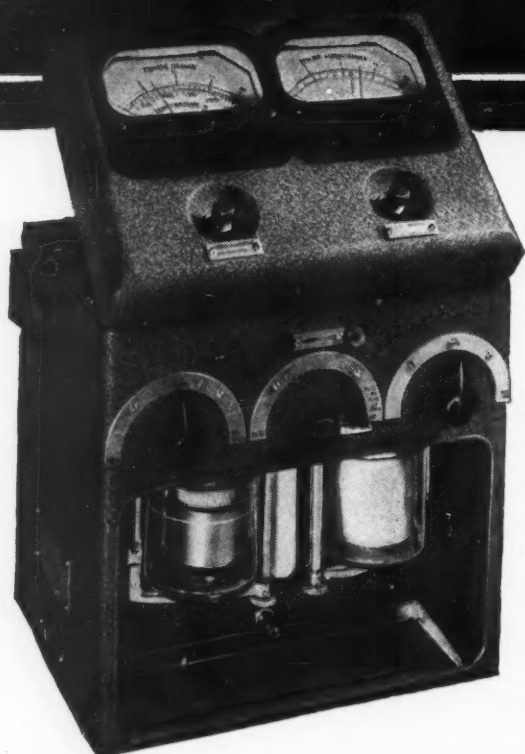
Athey
APCOR

DEPENDABLE LOADING & HAULING EQUIPMENT



How much fuel flies out the Flue? Answer _____

**THE CITIES SERVICE INDUSTRIAL HEAT PROVER WILL
GIVE YOU THE ANSWER IN JUST A FEW MINUTES!**



Applied to the flue or exhaust of any type of combustion equipment, the Cities Service Industrial Heat Prover analyzes spent gases—registers *immediately* on two carefully calibrated dials *the exact percentage* of unconsumed fuel and oxygen.

With this information, the Cities Service engineer can show you at once *how* to save on fuel costs...and what this saving will mean to you in dollars and cents each year.

This exclusive Cities Service instrument has been used with every kind of fuel and with every type of combustion equipment in this country.

For information leading to a demonstration of the Industrial Heat Prover, contact your nearest Cities Service office or . . .

Cities Service Oil Co.
Room 556, 70 PINE STREET, New York 5, N. Y.

Gentlemen: Please send me further information on the Cities Service Industrial Heat Prover—at no obligation to me.

Name

Title

Company

Address

City State

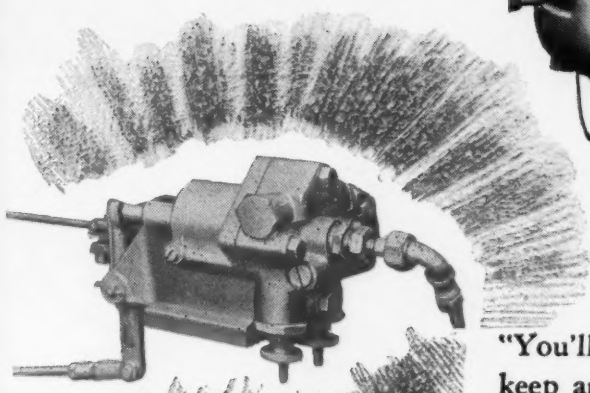
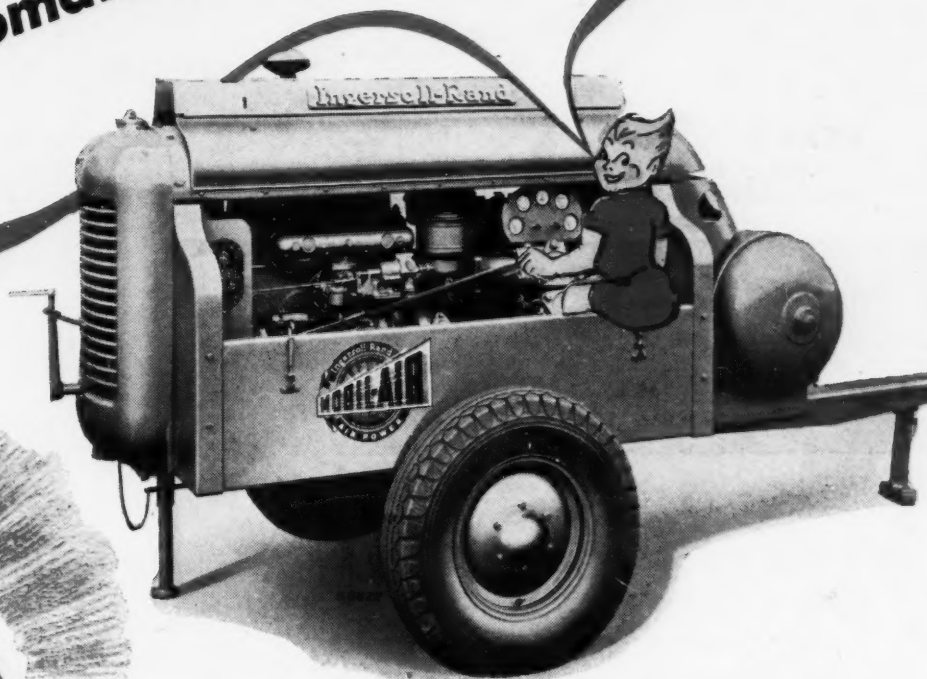
**MAIL THIS COUPON
TODAY**



(Available only in
Cities Service
Marketing Terri-
tories East of
the Rockies)



WHO...ME?
I'M THE DRILL-MORE REGULATOR
 ...the automatic pilot that saves fuel



Actually, the Drill-More Regulator looks like this. It has been standard on all K-Series Mobil-Air Compressors (105 to 500 cfm) since Ingersoll-Rand developed multi-speed regulation for portables.



COMPRESSORS
 CENTRIFUGAL PUMPS
 OIL & GAS ENGINES
 TURBO BLOWERS
 CONDENSERS
 AIR TOOLS
 ROCK DRILLS

"You'll find me in every K-Series MOBIL-AIR Compressor. I keep an eye on the air-pressure gauge, hold onto the engine-governor spring, and regulate the compressor speed according to the demand for air. When one of the air tools shuts off, the pressure goes up. If it reaches a given pressure, I ease up on the spring, and the compressor slows down a little but continues to compress air.

"I *unload* the compressor cylinders *only* when less than half capacity is used. When reloading, I hold *half* speed as long as the pressure stays up. That's how I eliminate wasteful idling.

"On many jobs, I can save up to 30% in fuel... by myself. I maintain a higher average and more uniform air pressure, too, so that air tools do as much as 15% more work.

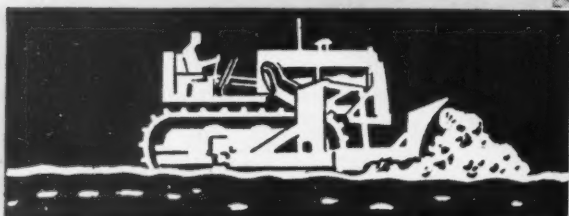
"I'd like to help you save *fuel, time, and money*. When you need a portable compressor, remember me... *Drill-More Multi-Speed Regulator.*"

Ingersoll-Rand
 11 BROADWAY, NEW YORK 4, N. Y. 2-785

Zoned

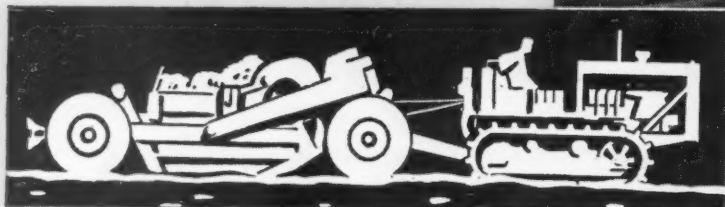
ZONE 1

"Caterpillar" Diesel track-type Tractors equipped with bulldozers.



ZONE 2

"Caterpillar" Diesel track-type Tractors for loading and pulling scrapers.



ZONE 3

"Caterpillar" Diesel wheel-type Tractors for high-speed hauls.



Equipment

**DOES
THE
JOB**

**better
quicker
cheaper**

"Use the right tool for the job" is an old rule—and a sound one—that is followed in every successful factory, shop or craftsmen's trade. It is just as applicable in the great industry of earthmoving. Contractor, customer and community alike benefit when it is put into practice.

Here, for instance, on the Canton-Akron airport project, three contracting concerns got together in setting the job up *right*—with ZONED EQUIPMENT to fit the varying hauls.* And that's the one "best" way to get top results on *any* large earthmoving operation.

The "Caterpillar" line has been steadily broadened to enable the contractor to "zone" his jobs with equipment obtained completely

from *one source*—under the quality-and-performance responsibility of *one manufacturer*—and serviced through *one dealer organization* that is thoroughly equipped, experienced and always within easy reach.

What do *you* need to zone your next jobs for better, quicker, more profitable results? Talk it over with your "Caterpillar" dealer. And keep in mind that "Caterpillar" *job-engineering* help is available if you want it.

• • •

★Illustrations show some of the *zoned* equipment used on this project. It includes 8 "Caterpillar" track-type Tractors operating carry-scrapers on heavy hauls of 1000 feet and under; 3 operating 'dozers on the "push" distances; and 8 "Caterpillar" Diesel wheel-type Tractors operating scrapers on the "speed" hauls of 2000 feet and over.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.
ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



The discharged veteran wears this emblem. Remember his service and honor him.

The Largest Line of **HOMELITE** GENERATORS

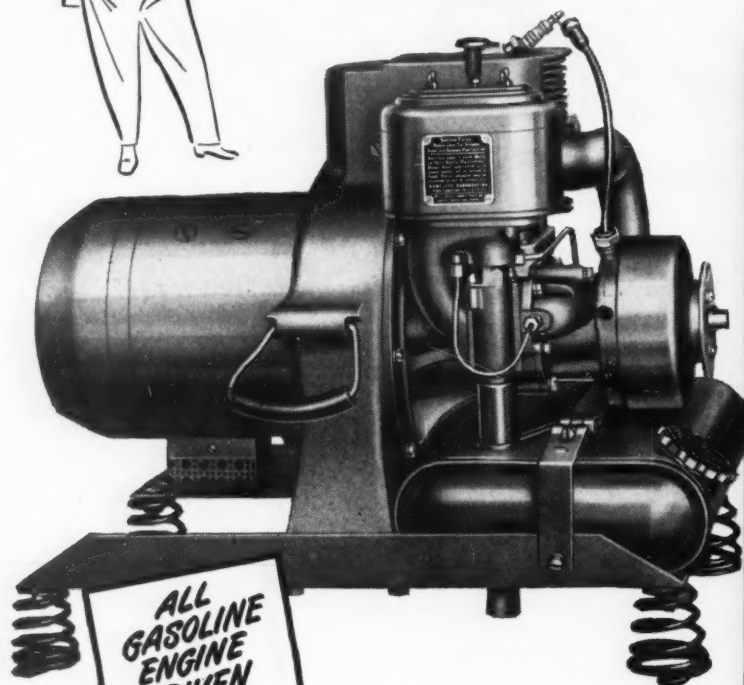
ALL
NEW...



ALL
PORTABLE



Ever Offered...



ALL
GASOLINE
ENGINE
DRIVEN



SEE WHAT THEY CAN DO FOR YOU

Send for Bulletin L-406 or better yet, arrange for a demonstration. The Homelite representative in your territory will gladly show you how Homelite Generators can be used for operating floodlights, power tools, or any electrical equipment, or for standby service to maintain lighting, communications, or similar services. Write today. No obligation.

HOMELITE

CORPORATION

Portable PUMPS • GENERATORS • BLOWERS
PORT CHESTER, NEW YORK

STANDARD MODELS NOW AVAILABLE

(Special units built to meet your requirements)

GENERATOR MODELS	VOLTS	AMPS.	WATTS UNITY PF
DC Compound Wound			
22D120	* 120	6.2	750
23D120	120	12.5	1500
21D120	120	16.7	2000
24D120	120	20.8	2500
25D120	120	33.4	4000
AC MODELS			
60 Cycle Single Phase			
22A115	115	4.3	500
23A115-11	115	8.7	1000
23A115-1	115	13	1500
21A115	115	15.6	1800
24A115	115	21.7	2500
25A115	115	34.8	4000
24A115/230	115/230	10.9	2500
25A115/230	115/230	17.4	4000
DC MODELS—Shunt Wound			
23D30	22-30	50	1500
24D30	22-30	83.3	2500
22D60	42-60	12.5	750
23D60	42-60	25	1500
21D60	42-60	33.3	2000
24D60	42-60	41.7	2500
25D60	42-60	66.7	4000
22D160	130-160	4.7	750
23D160	130-160	9.4	1500
21D160	130-160	12.5	2000
24D160	130-160	15.6	2500
25D160	130-160	25	4000
AC — 60 Cycle 3 Phase			
24A230	230	6.3	2500
25A230	230	10.0	4000
AC — 180 Cycle 3 Phase			
24AH230	230	6.3	2500
25AH230	230	10.0	4000



MIX and SPREAD SOIL CEMENT IN *One* OPERATION?

***Sure!* WITH A WOOD ROADMIXER**

★ HERE ARE THE *Facts!*

The Wood Roadmixer is the pioneer and leading travel plant method of rapid, low cost, high quality pavement construction. It is pulled and powered by a standard crawler tractor. Supply truck is towed behind or parallels the mixer. The Wood Roadmixer is made in two sizes, handling up to 8 cu. ft. windrows.

Grade the surface to be paved and windrow materials to be mixed into equalized windrows. Proportion cement on windrows ahead of mixer either by bulk distribution or by sack. Make *ONE* pass with a Wood Roadmixer, adding correct amount of water, then spread—all in one operation.

That's a typical soil cement operation with a Wood Roadmixer—and it's a typical operation on road mix surfacing, mix-in-place asphalt base, flexible base or any type of stabilized base, using emulsions, road oils, tars, etc.

Sounds simple, doesn't it? And it is, because the Wood Roadmixer is a complete traveling mixing plant. It uses local or native materials, requires only two men on a normal job, ties up a minimum of equipment and produces from 250 to 350 tons per hour of ready-to-spread mix. The result is less cost per square yard or per ton—as *much as two-thirds less!*

That's why you should know *all* about the Wood Roadmixer. See your nearest dealer or write direct for literature and prices.

WOOD MANUFACTURING CO.

BOX 32, 6900 TUJUNGA AVE.

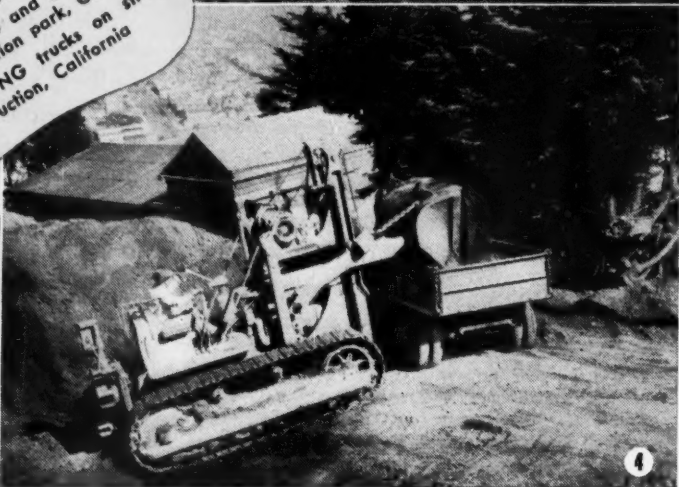
NORTH HOLLYWOOD, CALIF.

Good Operators **TRAXCAVATE!**

**IT'S THE MODERN EARTH-MOVING
AND MATERIAL-HANDLING METHOD**

IT'S the profitable thing to do! TRAXCAVATORS dig, load, grade, carry and do so many other important tasks efficiently that their dependable all-around utility seems limitless. TRAXCAVATORS do more work on more jobs . . . are virtually one-machine gangs at most every earth-moving and material-handling task . . . can keep profitably busy all year 'round.

Your TRACKSON—"Caterpillar" dealer will show you how these versatile machines can simplify your equipment needs. There's a size for every job and purpose, with bucket capacities from $\frac{1}{2}$ to $2\frac{1}{2}$ yards. See him today, or write for informative literature to TRACKSON COMPANY, Dept. CM-16, Milwaukee 1, Wisconsin.



- 1 DIGGING and leveling for tank farm site, Georgia
- 2 GRADING for new pipe line right of way, Iowa
- 3 CARRYING and grading for a recreation park, Ohio
- 4 LOADING trucks on street construction, California



DIGS

GRADES



TRAXCAVATOR

REG. U. S. PAT. OFF.

THE ORIGINAL TRACTOR EXCAVATOR



LOADS

CARRIES



► Here it is . . . The New . . .



MOTO-PAVER



Resurfacing a Michigan Road with the Moto-paver

An Entirely Self Contained, Self Propelled Asphalt Mixing and Laying Machine

Mixes, Spreads and Lays Any Type of Mixed-in-place Bituminous Material to Any Road Width, Thickness and Crown Condition.

Hetherington & Berner Inc., America's first builders of asphalt mixing machinery, proudly present the Moto-paver—the last word in asphalt mixing and laying equipment. This highly flexible and mobile machine is a complete traveling asphalt mixer and paver, requiring no separate loader, spreader or other paving equipment, and no trailer to haul it from one job to another. The Moto-paver is mounted on pneumatic tires, and powered by two gasoline engines, one driving the mixer and related units, the other driving the machine along the road. Paving speed is from 4 to 50 feet per minute, road speed 15 to 18 miles per hour. Mixing capacity is 100 to 120 tons per hour.

The Moto-paver mixes and lays all but the highest types of bituminous concrete. It is especially suitable for resurfacing trunk roads and streets of smaller municipalities, but it is also an efficient unit for new construction work on roads, streets, airports, parking lots, driveways, etc.

Write for bulletin MP-46, which gives complete information and specifications.

HETHERINGTON & BERNER INC. • 735 KENTUCKY AVE. • INDIANAPOLIS 7, IND.

Hetherington & Berner



*America's First Builders of
Asphalt Mixing Machinery*

A COMPANY IS KNOWN BY

the Distributors It Keeps . . .

Here at Novo, we are mighty proud of our distributors; and for a number of very good reasons. One reason, of course, is their standing in their communities. They are progressive . . . wide-awake . . . respected and trusted in their counsel on customer problems.

But we're equally proud that their success reflects so truly the quality of Novo equipment. That they—and their customers in turn—are enthusiastic about the trouble-free performance of Novo products is proved by their length of association with Novo—eleven have been with us from 20 to 27 years; fifteen from 10 to 20 years; and nineteen from 5 to 10 years.

Yes, a company is known by the distributors it KEEPS; and just as surely, distributors are known by the company they represent, for the integrity of the product they sell enhances their success. We are justly proud of our mutual efforts.

W. H. ANDERSON COMPANY, INC.
Detroit, Michigan

CLYDE W. BECKNER, INC.
Charleston, West Virginia

FRED BERRYHILL EQUIPMENT CO.
Lubbock, Texas

BLAKE EQUIPMENT COMPANY
Columbus, Ohio

BLUEFIELD SUPPLY COMPANY
Bluefield, West Virginia

THE BOARDMAN COMPANY
Oklahoma City, Oklahoma

ROCK EQUIPMENT COMPANY
Indianapolis, Indiana

BORCHERT-INGERSOLL, INC.
St. Paul—Duluth, Minnesota

BRINKER SUPPLY COMPANY
Pittsburgh, Pennsylvania

BURAN EQUIPMENT COMPANY
Oakland—Eureka, California

DON A. CARPENTER & COMPANY
El Paso, Texas

COLUMBIA EQUIPMENT COMPANY
Portland, Oregon

Seattle—Spokane, Washington

CONTRACTORS SERVICE, INC.
Charlotte, N. C.

CREDLE EQUIPMENT COMPANY
Utica, New York

DEMPSTER BROTHERS
Knoxville—Nashville, Tennessee

MATT A. DOETSCH MACHINERY CO.
Washington, D.C.

EASTERN EQUIPMENT, LTD.
Fredericton, New Brunswick, Can.

EASTERN TRACTOR AND
EQUIPMENT COMPANY

Portland, Maine

EDMUND SUPPLY COMPANY
Toledo, Ohio

E. K. S. EQUIPMENT COMPANY
Grand Rapids, Michigan

EPPELSON & COMPANY
Tampa, Florida

EQUITABLE EQUIPMENT COMPANY
New Orleans, Louisiana

B. C. EQUIPMENT COMPANY, LTD.
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FARQUHAR MACHINERY COMPANY
Jacksonville, Florida

FEHRS TRACTOR & EQUIPMENT CO.
Omaha, Nebraska

FERGUSON SUPPLY COMPANY, LTD.
Calgary, Alberta, Canada

THE FINN EQUIPMENT COMPANY
Cincinnati, Ohio

JOHN B. FOLEY, JR.
Syracuse, New York

FROST MACHINERY COMPANY, LTD.
Winnipeg, Manitoba, Canada

FUNKHOUSER MACHINERY CO.
Kansas City 8, Missouri

GARLINGHOUSE BROTHERS
Los Angeles, California

GENERAL EQUIPMENT & SUPPLY CO.
Miami, Florida

GILL EQUIPMENT COMPANY
Atlanta, Georgia

GLOBE MACHINERY & SUPPLY CO.
De Moines, Iowa

HAVERSTICK & COMPANY, INC.
Rochester, New York

HENDRIE & BOLTHOFF
Denver, Colorado

INDUSTRIAL MACHINERY CO., INC.
Halifax, Nova Scotia

INDUSTRIAL SUPPLY COMPANY
Richmond, Virginia

THE LANG COMPANY
Salt Lake City, Utah

LITTLE ROCKROAD MACHINERY CO.
Little Rock, Arkansas

MARYLAND SUPPLY & EQUIPMENT
COMPANY

Baltimore, Maryland

METALWELD, INC.
Philadelphia, Pennsylvania

MINE & SMELTER EQUIPMENT CO.
Phoenix, Arizona

MISSOURI-ILLINOIS TRACTOR &
EQUIPMENT COMPANY

St. Louis, Missouri

MONTANA HARDWARE COMPANY
Butte—Great Falls, Montana

MUSSENS CANADA LIMITED
Montreal, Quebec

Toronto, Ontario

MYHRA EQUIPMENT COMPANY
Fargo, North Dakota

NATIONAL EQUIPMENT COMPANY
510-512 South Clay Street
Louisville, Kentucky

NEVADA TRUCK SALES
Reno, Nevada

NORTHWEST SUPPLY & EQUIPMENT
COMPANY

Marietta, Ohio

H. O. PENN MACHINERY COMPANY
New York City—Poughkeepsie, N.Y.

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PERRIN, SEAMANS & CO., INC.
Boston, Massachusetts

HENRY A. PETER SUPPLY CO.
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SAN ANTONIO MACHINE &
SUPPLY CO.

San Antonio—Waco—
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SERVIS EQUIPMENT COMPANY
Dallas, Texas

SMITH TRACTOR & EQUIPMENT CO.
Irvington, New Jersey

SOUTH TEXAS EQUIPMENT CO.
Houston 1, Texas

STONE MANUFACTURING COMPANY
Milwaukee, Wisconsin

STRAITS ENGINEERING COMPANY
Sault Ste. Marie, Michigan

Service and Supply Division
LAKE SHORE ENGINEERING
COMPANY

Iron Mountain, Michigan

M. F. TAYLOR COMPANY
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ROY C. THOMPSON COMPANY
Presque Isle, Maine

TIDEWATER SUPPLY COMPANY, INC.
Columbia, South Carolina

Norfolk, Virginia
Roanoke, Virginia

VAN NOUHUYS PUMP & SUPPLY CO.
Albany, New York

WATKINS-ALDRIDGE EQUIPMENT
COMPANY, LTD.

Jackson, Mississippi

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Rock Island, Illinois

WHEELER EQUIPMENT COMPANY
Buffalo, New York

YOUNG AND VANN SUPPLY CO.
Birmingham, Alabama

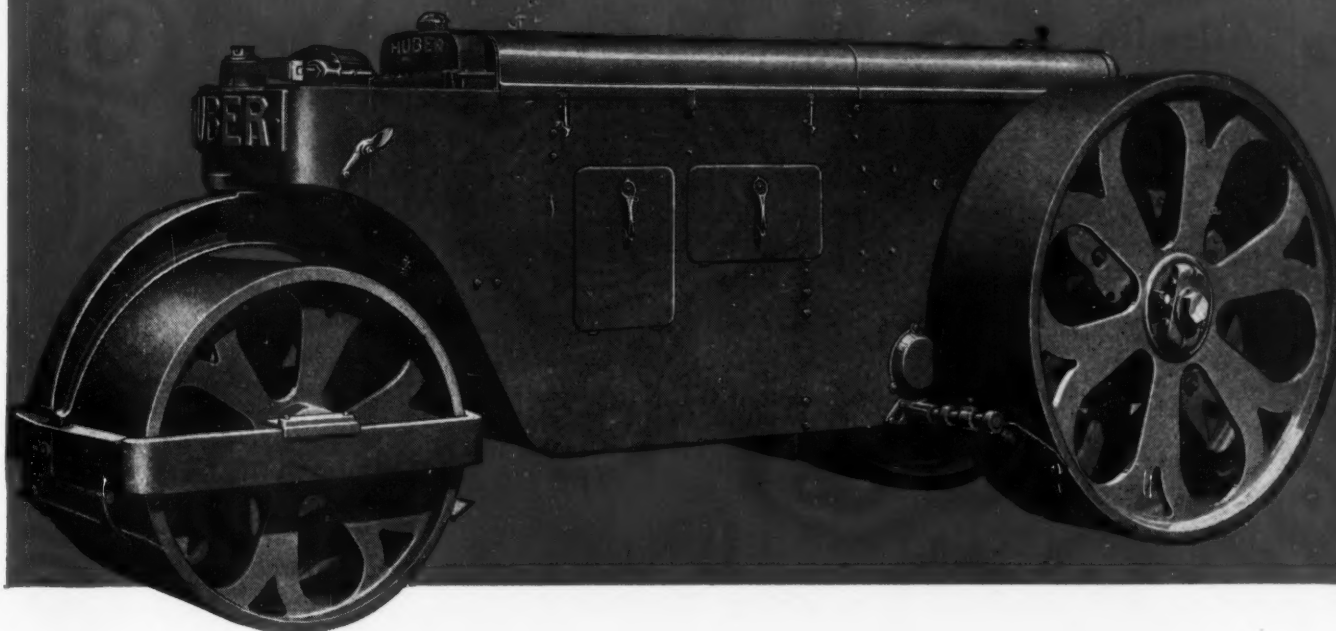
... and DISTRIBUTORS ARE KNOWN BY
the Company They Keep



Allied Member of A.E.D.



*Would you buy a
car like this today?*
... OF COURSE NOT



Just as 1946 motor travel calls for a modern automobile,
today's construction job demands an up-to-the-minute roller—
a HUBER HEVI-DUTY. Rugged, heavy solidness for the toughest
punishment plus power and speed to spare — that's the HUBER
HEVI-DUTY, available in 10 and 12 ton sizes. Let us tell you the whole story.

THE  MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER ROLLERS

"I Have Never Seen Breakage Like This!"

That's what Superintendents say everywhere Atlas Rockmasters are tried. The results of this new and different electric blasting device and the Rockmaster system are amazing.

➔ Atlas Rockmasters and the Rockmaster Blasting System . . .

- **REDUCE SECONDARY BLASTING**—on a particularly tough job secondary blasting was cut from a 6 man 2 shift to a 2 man 2 shift operation. (*A 66⅔% Reduction.*)
- **REDUCE BACK BREAK**—drillers get more footage in solid rock.
- **REDUCE VIBRATION**—a 20 hole shot produced less objectionable vibration than an 8 hole shot by old methods.

Atlas Rockmasters and the Rockmaster Blasting System are *NEW . . . DIFFERENT*

ATLAS FIRST

Another in the series of really important blasting developments you expect from Atlas.

A COMPLETE SYSTEM

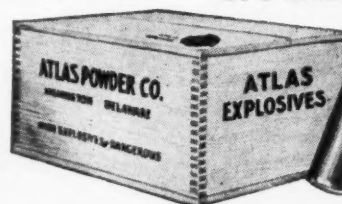
Such results come from a whole new system of blasting. Electric blasting cap is new—explosives have been geared to the job—methods of selecting, handling, and loading have been re-designed. It's the combination that means money to you.

It's an exclusive Atlas development. Only the Atlas Representative can tell you about it. Call on him today and try the new Atlas Rockmaster system in your toughest shooting.

Results will amaze you.

**You'll know
Rockmaster
It's Blue**

ATLAS ROCKMASTER



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

Williams "Superrenches"⁹⁹

FOR STREAMLINED STRENGTH

Slim, trim "Superrenches" deliver agile power to inaccessible places. Drop-forged from selected alloy steel and heat-treated, their thin, tapered jaws combine unbelievable strength with minimum bulk and weight. These versatile wrenches are made in a variety of popular patterns, with openings ranging from $\frac{3}{16}$ " to $3\frac{1}{8}$ ". Sold by Industrial Distributors everywhere.

J. H. WILLIAMS & CO., BUFFALO 7, NEW YORK

WILLIAMS
DROP-FORGINGS AND
DROP-FORGED TOOLS



these war-born ...do scores of peacetime jobs.



... for farmers

On farms and large estates these thrifty little outfits will pay for themselves in a hurry—building roads and soil-saving dams, filling in feed lots, digging stock ponds and irrigating ditches, levelling off uneven ground, etc.



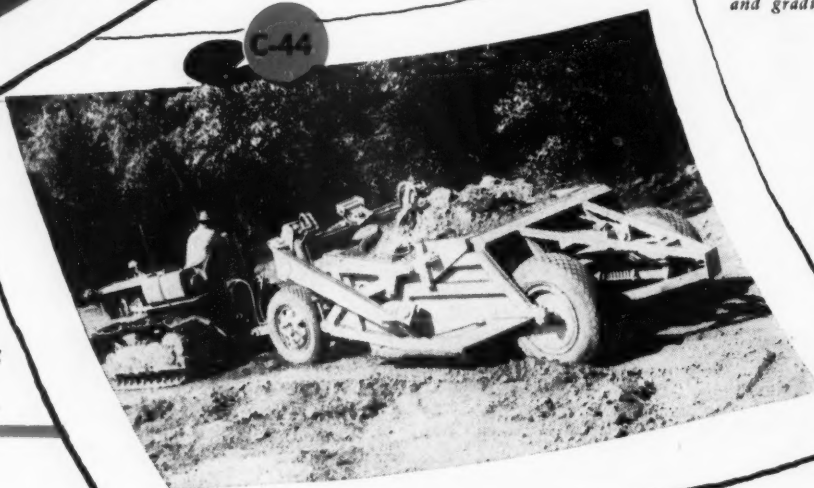
... for counties and states

These little 2 and 4-yard outfits are just what you need for ditching and shoulder work... for widening and maintaining roads and driveways... for repairing small slides and washouts... and for countless other jobs, such as filling in around culverts, bridge abutments, etc.



... for small contractors

Good news indeed for thousands of small contractors who have been looking for a low cost, easily transported rig that will enlarge their job opportunities and profit range on all kinds of light excavation, levelling, stripping and grading work.



**low in cost.
with either**

BRIEF SPECIFICATIONS

	Model C-22	Model C-24	Model C-42	Model C-44
Capacity	1 3/4-2 Yds.	1 3/4-2 Yds.	4-5 Yds.	4-5 Yds.
Tractor	Rubber-Tired	Crawler	Rubber-Tired	Crawler
Type	Tilting Bowl	Tilting Bowl	Positive	Positive
	Front Dump	Front Dump	Forced Ejection	Forced Ejection
Length	13'	16'4"	12'9 1/2"	17'
Width	71"	71"	92 3/4"	92 3/4"
Weight	2550 lbs.	2800 lbs.	6200 lbs.	6500 lbs.

ESTIMATED YARDAGE TABLE

● Here's a reasonable estimate of the number of yards moved per hour by LaPlant-Choate C-22 and C-42 scrapers behind high speed rubber-tired tractors of 22-28 DHP and 40-50 DHP respectively. Yardage is based on self-loading in good scraper material, with properly maintained haul roads.

Model	LENGTH OF HAUL IN FEET								Load, Turn and Dump Time	Pay Yards Per Trip
	200'	300'	400'	500'	600'	800'	1000'	2000'		
C-22	38	32	29	26	24	22	21	17	1.5 Min.	1.75
C-42	69	59	55	52	50	46	44	32	1.75 Min.	3.75

Watch for More Great News!

● This is only one of a series of important announcements designed to bring you pertinent facts about LaPlant-Choate's great new earthmoving line—including many new and outstanding developments in cable and hydraulic operated scrapers, hydraulic dozers, cable and hydraulic power control units—plus a new "surprise" in high speed, big capacity earthmoving rigs. So before you start lining up new equipment for tomorrow's jobs, be sure to see the new LPC's—created by LaPlant-Choate's extensive war-time experience and "seasoned" by over a third of a century of engineering and manufacturing "know-how."

We'll be seeing you at the ARBA Convention, Chicago, Jan. 14-17.

LaPLANT

Engineered

"baby" scrapers

faster... cheaper... better!



... for railroads

Small... sturdy... maneuverable, these "baby" LaPlant-Choate scrapers provide an economical answer to the problems of cleaning ditches along right-of-way, bank sloping, repairing roadway breaks, distributing ballast—and a "101" other utility jobs.



... for big contractors

Even large contractors will find it profitable to employ several of these little "commandos" for handling ditching and finishing jobs—and for getting in and around dozens of spots where the use of bigger outfits is often impracticable.



... for general utility

Besides saving time and money on hundreds of light earthmoving jobs around parks, golf courses, cemeteries and in industrial properties, these little machines can also be used effectively for removing snow, leaves, etc.



simple to operate... readily adaptable for use crawler-type or high speed rubber tired tractors

Now, for the first time, you can get these amazingly efficient 2 and 4-yard scrapers, fitted for use with either crawler or high speed rubber tired tractors—at a price within the most modest budget. Developed especially for the U. S. Airborne Engineers, and used by the hundreds on military projects all over the world, these "baby" LaPlant-Choate scrapers are now ready to help you speed work and reduce costs on a wide variety of peace-time jobs.

Whether you select the inexpensive 2-yard design with gravity dump, or the larger 4-yard

model with positive forced ejection and controlled spreading, remember both are easily adapted for use with tracks or rubber. Both are equipped with LPC's improved single unit hydraulic system for faster, more dependable operation. Both are skilfully engineered to move earth at the lowest possible cost per yard within their respective job ranges. So for better results and bigger profits tomorrow, get complete facts today on these two great new LPC "Carrimors". Just address: LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; San Leandro, Calif.

CHOATE

Earthmoving

lowest possible cost
per yard

"MORETRENCH Suits Us Fine!"

**Modern Equipment
Good Service
Economical Results**



Williford Plumbing & Heating Co.

L. F. WILLIFORD, PROPRIETOR
PHONE 318
Troy, Alabama

October 9th, 1945

Moretrench Corporation,
New Orleans, La.

Gentlemen:-

Enclosed please find our check in the amount of \$1376.29 as per your statement covering our account with you in full.

We desire at this time to express our many thanks to your firm for the hearty cooperation extended us on our job at Fort Walton Fla., where we had your system in operation. Your service together with modern equipment made our job of dewatering very simple and most economical and we can assure you that in the future, should we need dewatering equipment, Moretrench suits us fine.

Thanks for your very liberal credit extended also, as we found it worked to our advantage numerous times.

Yours very truly,
Williford Plumbing & Heating Co.

By *Louis F. Williford*

Orig:NY
cc:R
cc:SPE

Thank you Mr. Williford!

**GET A MORETRENCH WELLPOINT SYSTEM
WHEN YOU WANT TO DIG IT "IN THE DRY".**

MORETRENCH CORPORATION

90 WEST STREET, NEW YORK 6

ROCKAWAY, NEW JERSEY

CHICAGO 23, ILL.

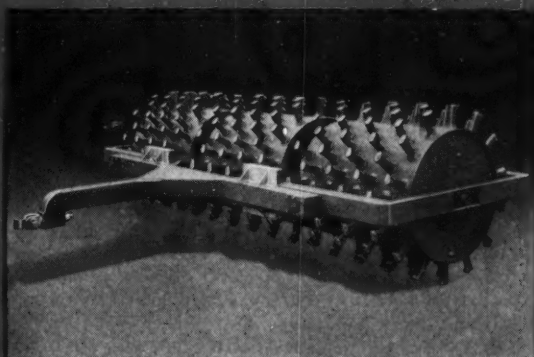
NEW ORLEANS 13, LA.

HOUSTON 8, TEX.

TAMPA 6, FLA.



Heil Cable-operated Bulldozers and Trailbuilders are rugged, fast-operating, and perform dependably.



Heil Tamping Rollers are designed and built to give you a highly satisfactory tamping action.



Heil Hi-Speed Bottom Dump Wagons have high clearance doors operating on a clam-shell principle.

Heil Hi-Speed Cable Scrapers

"bite deep"
to give you bonus loads

Positive down-pressure on the cutting blade insures rapid soil penetration and faster digging action in any kind of dirt. These units really "bite deep" to give you a heaped 15-yard load in 40 to 50 seconds.

Fast acceleration and high travel speeds enable your operators to cut round-trip time and secure top operating efficiency, particularly on long hauls.

At the fill, this famous Hi-Speed Scraper spreads its load with a positive mechanical push-out action secured by tilting the floor. This fast-action discharge is accomplished by a leverage action which exerts a low line pull on the unloading cable. The cutting blade remains in a fixed position in relation to the sides of the bowl and does not tilt with the dumping floor. Thus the load can be spread at any desired height, and at travel speeds permitted by the grade.

Ask your Heil distributor for the details. Specify "Heil" on all dirt-moving equipment and be assured of fast, profitable dirt-moving at low cost per yard.

R-50.

THE HEIL CO.

GENERAL OFFICES

MILWAUKEE 1, WISCONSIN

DOWN GOES “DOWN-TIME” *Up Goes Daily Output!*



SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: Magnolia Petroleum Company, General Petroleum Corporation of California

Here's how Socony-Vacuum's Complete Service helps solve Contractors' Maintenance Problems!

Whether you use 7 machines or 70, you get exactly the right oil or grease for every application. Socony-Vacuum's complete line of quality lubricants helps increase plant production, means

No matter where your job takes you, Socony-Vacuum's vast distribution facilities help you to reduce inventory problems — minimize field interruptions — by bringing you regularly scheduled

To save time and boost machine output, you get field-aided maintenance schedules—carefully adapted to your individual needs. Also lubrication training for "green" help. Consult

Your Socony-Vacuum Representative always works with your men . . . is trained to analyze and solve equipment problems. If necessary, he can also call in qualified engineering aid to

**Why Be Satisfied Merely With "Gas and Oil"
When You Can Get Complete Service?**

*Minimum
Breakdowns!*

*On-the-Job
Deliveries!*

*Simplified
Maintenance!*

*Help with
"Problem" Equipment!*

SOCONY-VACUUM



*Contractors'
Lubrication
SERVICE*

**CORRECT LUBRICATION
FOR EVERY PART
OF EVERY MACHINE**

*—Real Help with
Maintenance Problems!*

Tune in "Information Please"—Monday Evenings, 9:30 E.S.T.—NBC

Shock Absorber Construction!

● General licked the job of building a wartime tire that would do the same jobs done by pre-war tires. To do this, General developed a new type of tire construction.

"Shock-absorber" construction, it was named . . . because above all it reduced tire failures resulting from service damage. It *stops* shock concentrations . . . *distributes* heaviest service loads uniformly . . . *preserves* the carcass for more *original* service

. . . more *recap* service . . . at lowest cost.

These big, rugged Generals . . . like all General Tires . . . are built to America's top-standard of Top-Quality . . . are the product of skilled craftsmen and advanced tire engineering. It's no wonder, then, that General Off-the-Road Tires as well as Highway Tires are delivering the lowest cost tire performance in your industry.

THE GENERAL TIRE & RUBBER CO. • AKRON, OHIO



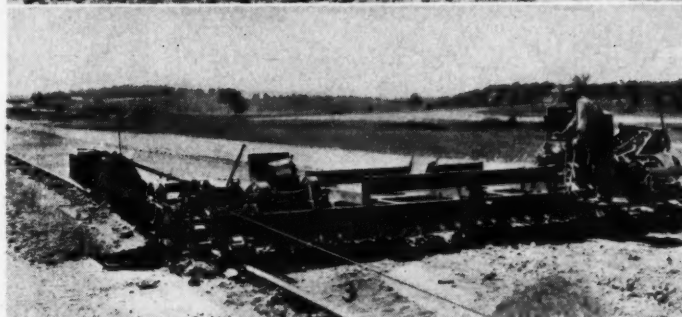
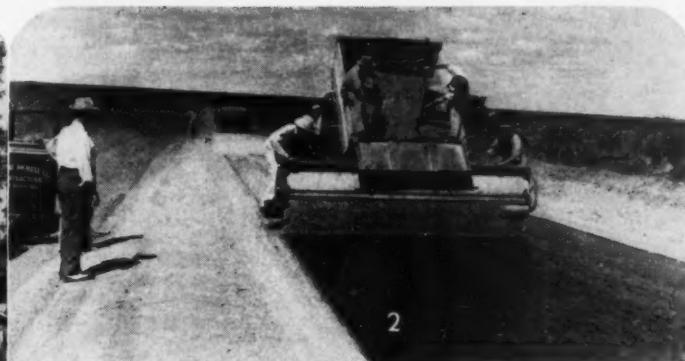
THE GENERAL
ROCK SPECIAL

THE GENERAL
DEEP CLEAT

The
**GENERAL
TIRE**

GENERAL OFF-THE-ROAD TIRES

Buckeye✓ COST CUTTING Super Six FOR HIGHWAY CONTRACTORS



1. BUCKEYE CLIPPER $\frac{1}{2}$ and $\frac{3}{4}$ yard convertible power shovels have "Mevac" Metered Vacuum Power Control, exclusively. Operator gets better "feel," quicker response.

2. BUCKEYE MATERIAL SPREADERS for seal coating and road maintenance, spread material evenly and in measured quantities.

3. BUCKEYE R-B FINEGRADERS provide in one operation a smooth, level, compact subgrade ready for the paver.

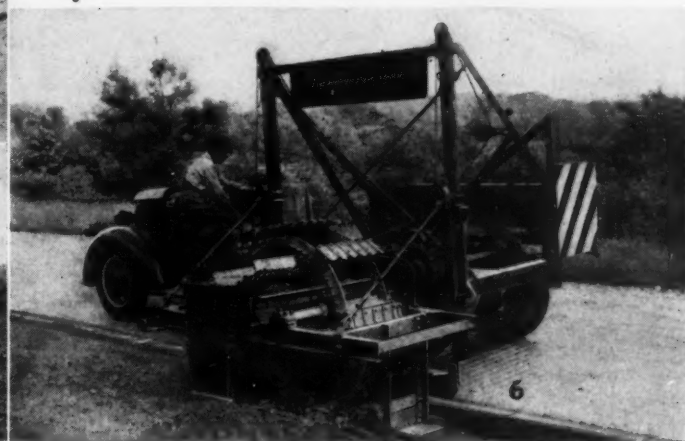
4. BUCKEYE TRENCHERS—a model for every trenching requirement—dig through any material short of solid rock. They will cut your trenching costs to the bone.

5. BUCKEYE DOZERS AND TRAILBUILDERS dig in and move bigger loads with less tractor effort—save time and money on any job.

6. BUCKEYE HIGHWAY WIDENERS cut smooth, clean trench of uniform width and depth, true to grade, leaving subgrade ready to receive material.

For the close bid jobs check the Buckeye Super Six.
Send for bulletins.

BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO



Built by **Buckeye✓**

CONVERTIBLE SHOVELS—BULLDOZERS—ROAD WIDENERS
TRENCHERS—MATERIAL SPREADERS—R-B FINEGRADERS

LIKE A CHAMPION SKATER



FORM-SET ROPE *is relaxed*

Ever watch a truly great skater? Ever watch him rocket down the straightaways, glide around the turns? He's graceful, swift, sure . . . a study in balance and smooth endurance . . . because he's *relaxed*.

You'll find much of that same relaxed quality in Bethlehem Form-Set rope. Form-Set rope is preformed; each wire and each strand is molded to its final helical shape before being laid in the rope. In this way many internal stresses and strains are relieved. Since the wires and strands are preshaped into their final form, they have no nervous urge to straighten themselves out. They do not fight to uncoil. The rope is *relaxed*.

Cut a section of Form-Set rope. You'll notice that not a single wire or strand pops loose from the rope. They all lie smoothly in place. To get them apart, you actually have to lift them out with your fingers.

What is the advantage of this *relaxation*? Clearly, it means easier handling. But more important still, it promotes *longer life* on jobs where bending fatigue is a serious item—and this includes practically all operating ropes.

Bethlehem furnishes every grade, size, and type with the Form-Set construction . . . the feature that *relaxes* wire rope.



Why a Form-Set (preformed) rope is relaxed. Preforming "sets" the wires and strands in their helical permanent shape, so that they have no tendency to fly apart, even when cut or broken.

When you think WIRE ROPE . . . think BETHLEHEM





Winter Work

alls for **FIRE CHIEF CANVAS**

When construction "goes under canvas"—insist on flame-resistant FIRE CHIEF Canvas and be sure that your windbreaks and tarpaulins aren't potential fire hazards.

FIRE CHIEF is the original fire, water, weather, mildew-resistant Hooperwood Canvas. Hot sparks from a salamander or even a weld-torch cannot set it aflame.

FIRE CHIEF lasts longer, too, because it resists all the elements of deterioration—sun, moisture and mildew. And since its working strength is greater than ordinary canvas, lighter weight fabrics may be used than were formerly necessary—all adding up to greater protection at less cost over the years.

WM. E. HOOPER & SONS CO.

New York PHILADELPHIA Chicago
Mills: WOODBERRY, BALTIMORE, MD.

Fire-Chief Finished

(PATENTED)

HOOPERWOOD COTTON DUCK



"we've had fewer men off sick

...since we use

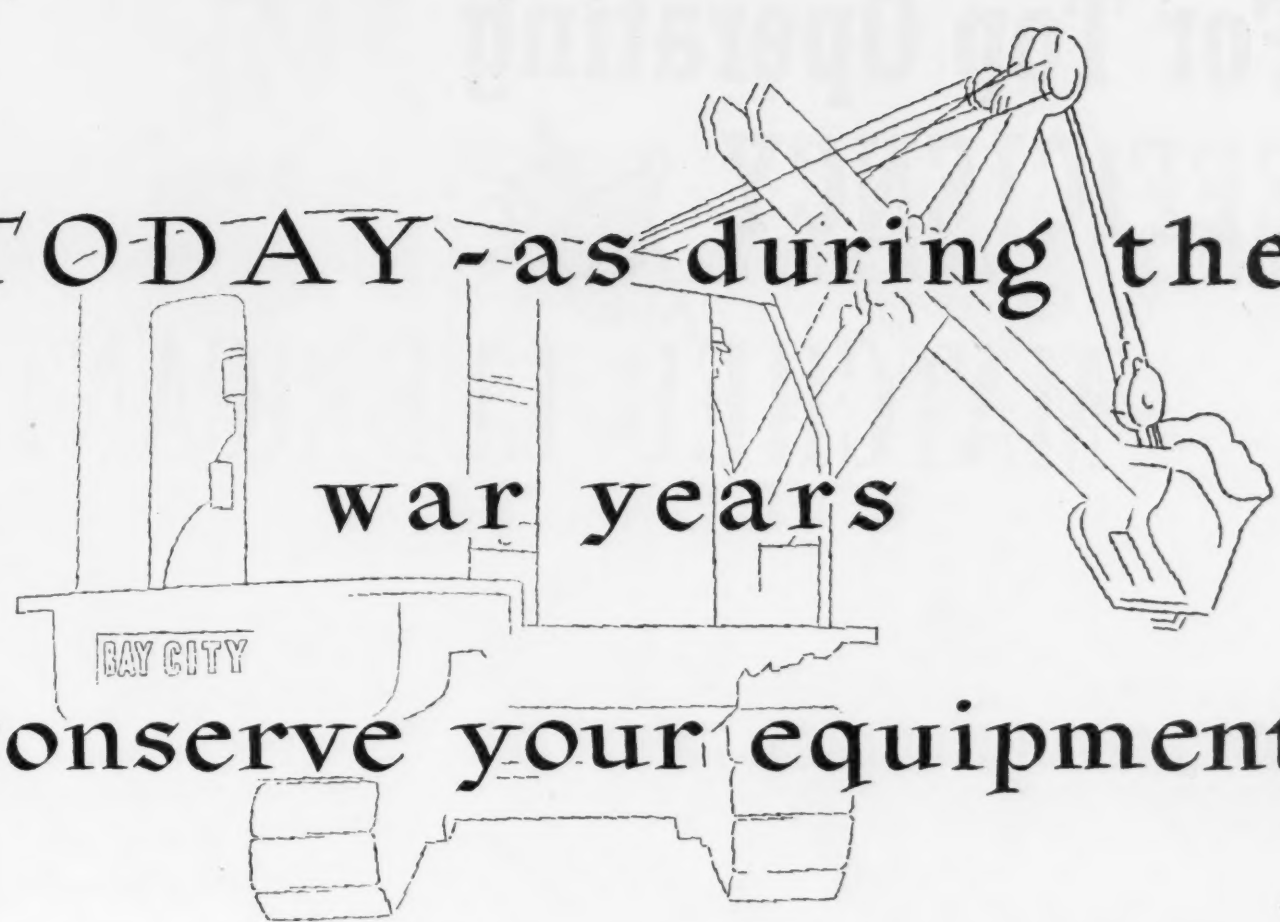
***VORTEX CUPS*"**

DIXIE'S
PORTABLE
WATER
CARRIER



Individual drinking cups help check the spread of colds and such mouth-carried infections. The Dixie Portable Water Carrier takes Dixie or Vortex Cups and cool, clean drinking water right where the men are working. It saves going for a drink, discourages "visiting", helps finish jobs on schedule.

DIXIE CUPS, VORTEX CUPS AND PAC-KUP CONTAINERS ARE MADE AT EASTON, PA., CHICAGO, ILL., DARLINGTON, S. C., TORONTO, CANADA



TODAY—as during the war years

conserve your equipment



NO other period in our history has so strengthened the loyalty of BAY CITY machine owners as the years of war production from which we recently emerged.

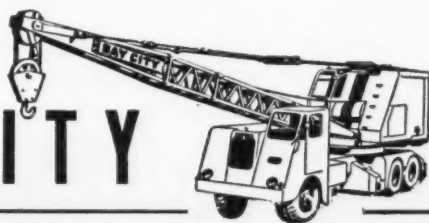
While we, at BAY CITY have been busy, night and day, filling war contracts our big family of users has appreciated, more than ever before the extra ruggedness and dependability of their equipment. They—and perhaps you are one of the family—have confirmed their judgment and belief that BAY CITY had the stamina—yes, the “guts”—to stand up on the job. They are glad the speed, the engineering refinements, the versatility of their cranes and shovels helped carry them through when new equipment was impossible to get.

Now that thousands of new shovels and cranes are needed, we are being swamped with a disproportionate

demand. We are building quality cranes and shovels at an accelerated rate. Yet, we cannot turn out BAY CITY equipment as fast as necessary to meet promptly all requirements for new machines.

So, we say—conserve your equipment as you did during the war years. Anticipate your needs for repair parts to replace those which have become worn from overwork. Rebuild your old BAY CITY—put it in efficient operating condition for the spring construction season—make it last until normal peacetime conditions return and new BAY CITY equipment is again readily available. Your nearest Dealer will be glad to help or write direct to BAY CITY SHOVELS, INC., Bay City, Michigan. Complete stock of repair and service parts of our manufacture available for quick shipment.

BAY CITY



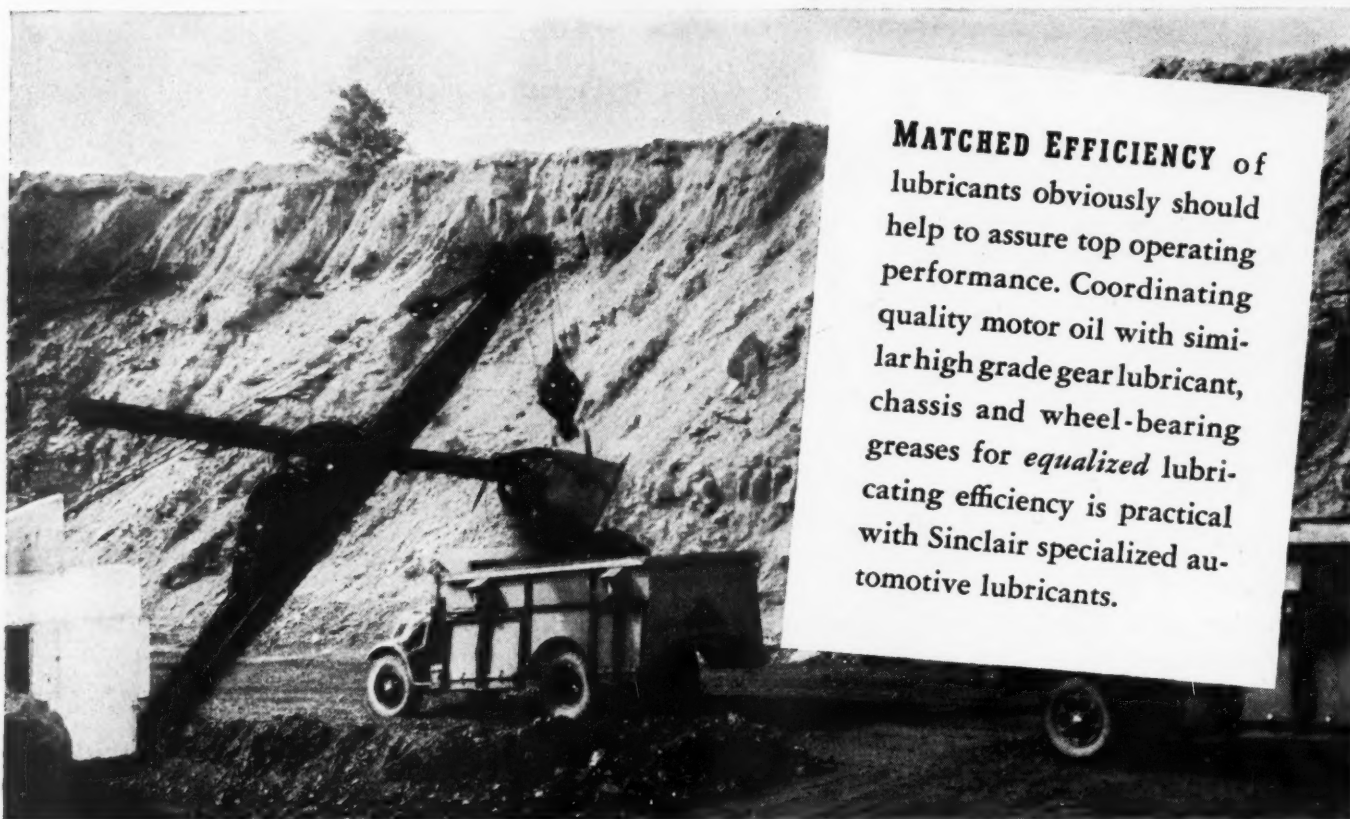
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CRANES • HOES • CLAMSHELLS

SEE YOUR NEAREST DEALER for Bay City excavating and material handling equipment in sizes from $\frac{3}{8}$ to $1\frac{1}{4}$ yards having crane rating up to 20 tons. Both crawler and pneumatic tire mounting.

For Top Operating EFFICIENCY



MATCHED LUBRICANTS



MATCHED EFFICIENCY of lubricants obviously should help to assure top operating performance. Coordinating quality motor oil with similar high grade gear lubricant, chassis and wheel-bearing greases for *equalized* lubricating efficiency is practical with Sinclair specialized automotive lubricants.

SINCLAIR OPALINE* MOTOR OIL offers positive engine lubrication, free acting rings, resistance to carbon deposit and crankcase accumulations, avoidance of bearing corrosion . . . **OPALINE GEAR LUBRICANT** provides extreme pressure lubricating protection to prevent galling and scuffing, resists oxidation under operating temperatures, and is free flowing under Winter conditions . . . **OPALINE CHASSIS LUBRICANT** has "staying" properties and

built-in extreme pressure characteristics . . . and for wheel bearings **SINCOLUBE** is designed to meet service temperature and pressure requirements, also keep an adequate lubricating film on balls and rollers, with freedom from leakage to brake linings and hubs.

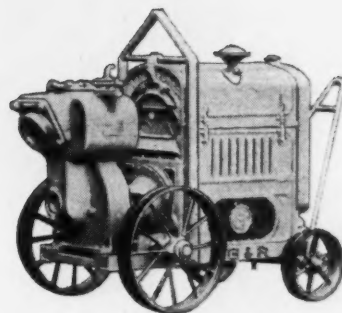
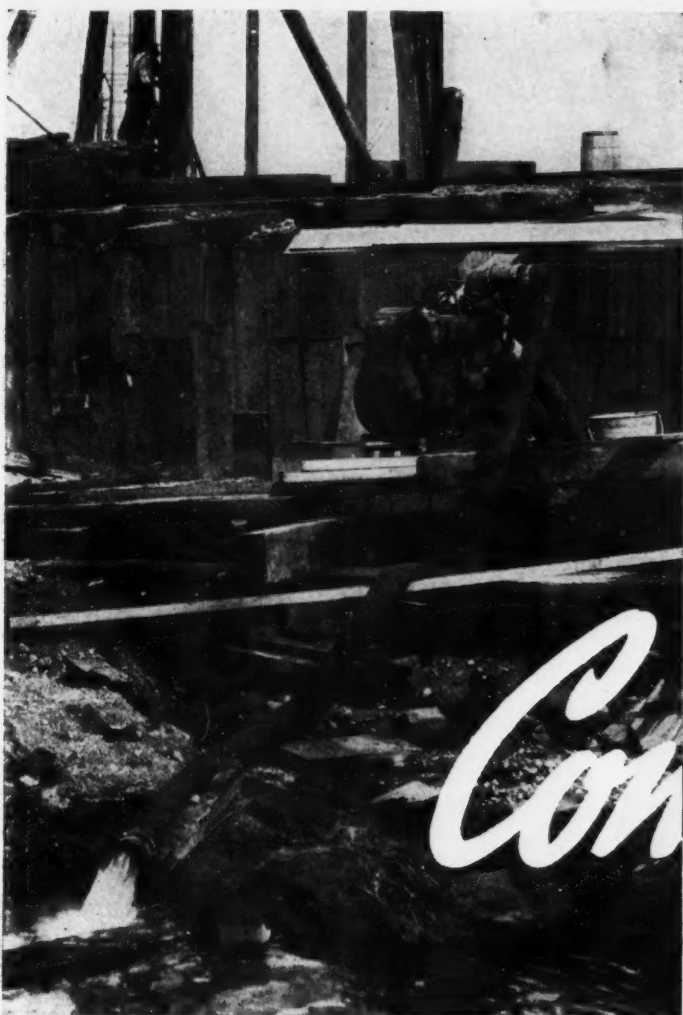
• • •

Try these matched lubricants for top operating efficiency and economy.

* Reg. U. S. Pat. Off.

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.



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ONLY WITH GORMAN-RUPP CONTRACTOR'S PUMPS

★ **DURABILITY** -- Three-month continuous runs without shut-down are common. Five years or more of heavy service without repair are frequently reported. Gorman-Rupps stay on the job!

★ **SIMPLICITY** -- Only one moving pump part - the impeller. No by-pass tubes or valves to make trouble. If maintenance is ever needed, it can be done in the field by unskilled labor with common tools. It's easy to keep a Gorman-Rupp running.

★ **EFFICIENCY** -- Pump interior is fully streamlined - streamlining where it counts! More water goes through in less time. Can't be clogged with weeds, muck or solids. For size of pump or gallon of fuel, Gorman-Rupps handle the most water.

★ **SELF-PRIMING** -- Start the engine and you start the water. That's all there is to it. No attention is needed. Electric drive models can be put on automatic operation.



Here's proof that Gorman-Rupp self-priming, centrifugal pumps are satisfactory! Order one and put it on the job for 30 days. If it isn't the best pump you ever used, we will take it back and it won't cost you a cent. Get yours now! There are no strings attached to this offer.

THE GORMAN-RUPP COMPANY

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HYDROTARDER SOON PAYS FOR ITSELF BY THESE SAVINGS

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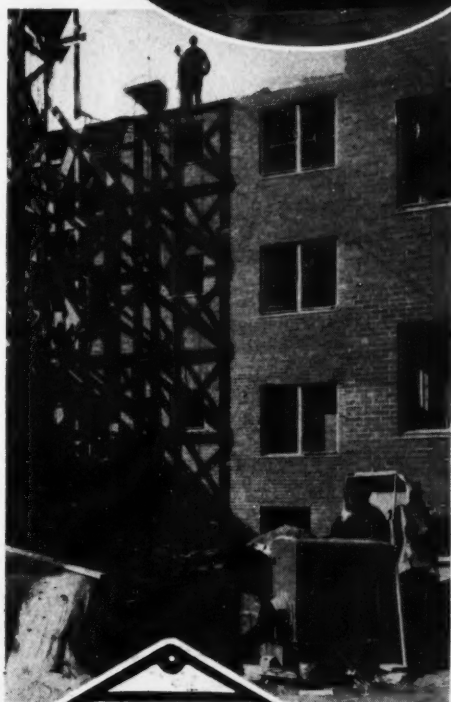
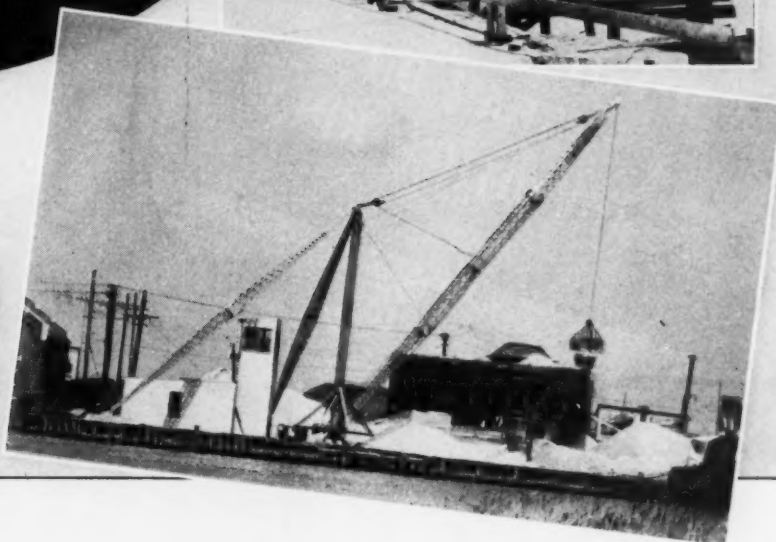
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3 BIG REASONS
why "MORE YARDS ARE MOVED ON
GOODYEAR
OFF-THE-ROAD TIRES
THAN ON
ANY OTHER KIND"

**1 SURE-GRIP
EARTH MOVER**
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Construction Methods

WALDO G. BOWMAN, Editor

Volume 28

JANUARY, 1946

Number 1

Dozer Attachment **Uproots Trees in Single Operation**

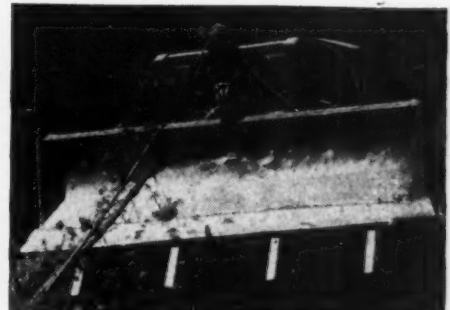


IN CLEARING A THICK growth of jackpine timber from the 10,200-acre Wickiup Reservoir site on the Deschutes Irrigation Project in central Oregon, engineers of the Bureau of Reclamation designed and built a special dozer attachment to speed operations. The device consists of a horizontal bar which extends several feet ahead of the bulldozer, making it possible to uproot a tree in a single forward motion. Uprooting cannot be done as efficiently by a dozer blade alone because the root system, spread close

HORIZONTAL BAR extending several feet forward of top of dozer blade applies pressure high up on tree to complete uprooting operation in one forward motion of tractor. Method is used by Bureau of Reclamation in clearing 10,200-acre Wickiup Reservoir site in Oregon.

Page 75

to the ground surface, comes up under the blade when it exerts pressure against the tree, thus making it necessary for the tractor to back up and move forward a second time. The Deschutes project will supply irrigation water for 50,000 acres of land near Madras, Ore. C. H. Spencer is construction engineer in charge of operations for the Bureau of Reclamation.



HIGH REACH OF STURDY FRAME (below) constructed of welded rails speeds clearing of heavy growth of jackpines. Wickiup Reservoir is scheduled to deliver initial supply of water for 50,000-acre North Unit of Deschutes Irrigation Project by next spring.

PILING TEETH ATTACHED TO BLADE expedite windrowing of uprooted trees by tractor-bulldozers in clearing of Wickiup Reservoir site.

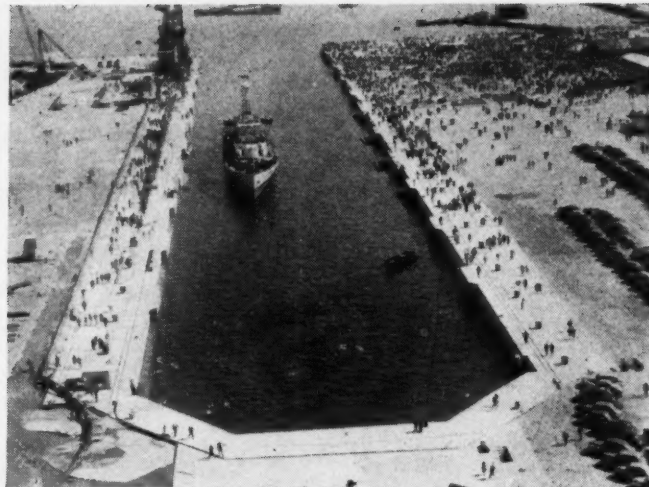




GERMAN WOMEN clear away rubble on wrecked Frederick Strasse in Russian sector of Berlin. Press Association Photo

Page 76

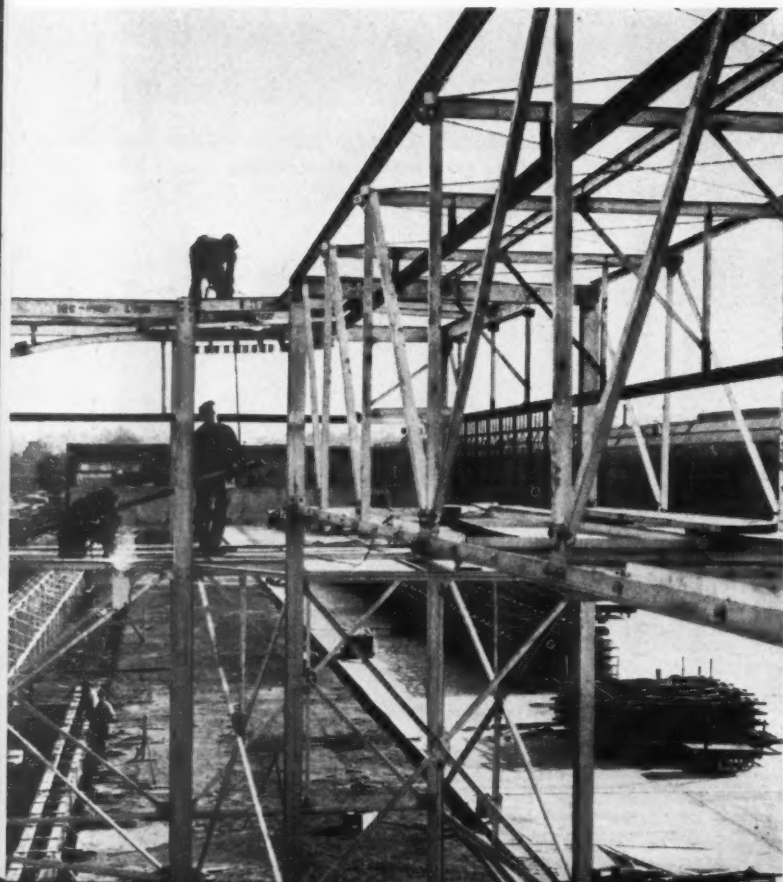
RECONVERSION AND EXPANSION PROGRAM at Studebaker Corp., in South Bend, Ind., will cost \$16,000,000. This ¼-mi.-long automobile frame conveyor (below), now nearing completion, will make possible direct delivery of frames from docks to head of assembly line.



LARGEST VESSELS AFLOAT can be handled by \$14,040,000 Sturrock Dock at Cape Town in South Africa which completes \$54,000,000 equipment of Table Bay Harbor. Here South African frigate Good Hope enters graving dock during opening ceremony. British Combine Photo

THIS MONTH'S NEWS REEL

SOUTH AMERICAN HIGHWAY ENGINEERS (below) study road practices in United States. Spending three months in this country under auspices of Office of Inter-American Affairs, Public Roads Administration and American Road Builders Association are (left to right, back row): JORGE LOPEZ, chief engineer, Public Works Department of city of La Paz, Bolivia; OSCAR RISOPATRON, chief engineer in charge of maintenance, Highway Department of Chile; ERNESTO BERRIOS, chief engineer in charge of equipment and materials, Highway Department of Chile; and LUIS A. MINO, chief engineer, Highway Department of Ecuador. With them are (seated): CHARLES M. UPHAM, A.R.B.A. engineer-director, and Office of Inter-American Affairs representatives FLOYD F. SHIELDS, acting director of overland transportation, and V. L. MINEAR, engineering consultant, department of transportation.



New Editorial Setup on Construction Methods

EFFECTIVE JAN. 1, 1946, James H. McGraw, Jr., president, McGraw-Hill Publishing Co., has appointed Waldo G. Bowman, present editor of *Engineering News-Record*, to be, in addition, editor of *Construction Methods*. With this move Robert K. Tomlin, a McGraw-Hill veteran of 37 years' service, who has been editor of *Construction Methods* for the last 18 years, becomes managing editor of that publication, in which position he will continue to apply his exceptional talents for pictorializing construction, at the same time being freed of the increasingly exacting field work required to meet the postwar editorial needs of *Construction Methods*.

Satisfaction of these needs will be greatly enhanced with the appointment by Mr. Bowman to important staff positions of two seasoned editors, Harold W. Richardson, formerly Western editor of *Engineering News-Record*, who becomes executive editor of *Construction Methods*, and Vincent B. Smith, formerly associate editor of *Construction Methods*, who becomes Western editor of both *Construction Methods* and *Engineering News-Record*.

Mr. Richardson, a graduate of the University of Colorado, joined the editorial staff of *Engineering News-Record* as construction editor in 1928, after several years as field superintendent for Bates & Rogers Construction Co. He went to Chicago in 1940 as Western editor. Co-author of two McGraw-Hill books, "Practical Tunnel Driving" and "Bulldozers Come First," Richardson is well known for his reporting of the Alcan Highway and Aleutian Islands war construction operations

in 1943 and 1944, and for a similar war correspondent assignment in 1945, which took him to Guam, Okinawa, the Philippines and Japan.

Mr. Smith, a graduate of Carnegie Institute of Technology, came to the *Construction Methods* staff in 1926, and for the last 19 years has been the author of a majority of the field construction articles that have appeared in the magazine, traveling extensively throughout the entire United States to inspect, photograph and describe construction jobs of all types. In 1944 Mr. Smith broke this routine for four months, to head a newly created research and development division of the American Society of Civil Engineers' Committee on Postwar Construction, charged with stimulating the completion of postwar designs and specifications.

Mr. Tomlin, after graduating

from Harvard University in 1907, worked first on the tunnels under the East River at New York, and then on the Catskill Aqueduct. In 1909 he came to the old *Engineering Record*, of which he became managing editor in 1913, a position he retained when his paper and *Engineering News* were combined in 1917. During World War I, Tomlin went to France as a war correspondent for *Engineering News-Record* and was later commissioned a captain in the Corps of Engineers, and in that capacity prepared the final report of Maj. Gen. Wm. C. Langfitt, chief engineer, a 437-page volume covering the engineering history of the A.E.F. He transferred from *Engineering News-Record* to the editorship of *Construction Methods* in 1928.

Mr. Bowman, a graduate of the University of Kansas, also attended the Harvard Graduate School of Business Administration and worked on structural steel design and erection for the Chicago Bridge & Iron Co., and the Boston Bridge Works before joining *Engineering News-Record* in 1925. He became associate editor in 1929, executive editor in 1939 and editor in 1940. Bowman is the author of the construction equipment section of Hool & Johnson's "Handbook of Building Construction" and a co-author of "Bulldozers Come First." In 1943 he was on a four months' war correspondent assignment that took him to England, North Africa and the Middle East, and in 1944-45 he was abroad again to cover the engineering-construction part of the war in France, Belgium, Holland and Germany.



WALDO G. BOWMAN, Editor



H. W. RICHARDSON, Executive Editor



R. K. TOMLIN, Managing Editor



V. B. SMITH, Western Editor

TRI-LEVEL BRIDGE on Willow Run Freeway, near Detroit, illustrates modern traffic interchange facilities. This expressway, constructed during the war years to accommodate workers employed at the Willow Run plant, conforms to standards proposed for expressways which will be built in the vicinity of other large industrial centers.

HIGHLIGHTS

IN THE ROAD-BUILDING PICTURE

Minimum Expenditure for Construction and Maintenance of Roads and Streets in Next Four Years Estimated at \$7,500,000,000. . . . Yearly Total of \$1,900,000,000 Includes \$1,200,000,000 for Construction and \$700,000,000 for Maintenance.

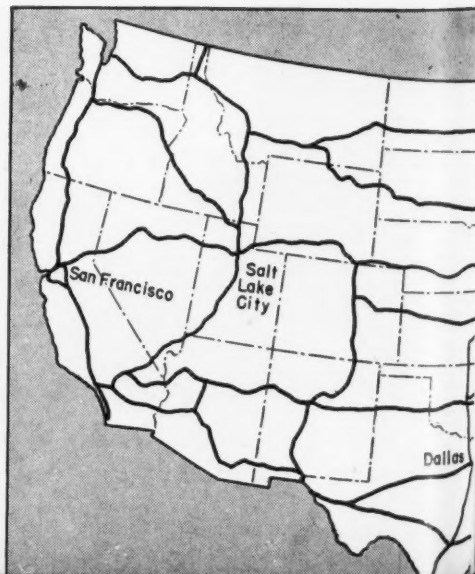
By **HERBERT S. FAIRBANK**

Deputy Commissioner,
Public Roads Administration,
Federal Works Agency
Washington, D. C.



HERBERT S. FAIRBANK, author of the accompanying article, is Deputy Commissioner, Public Roads Administration, Washington, D. C.

Page 78



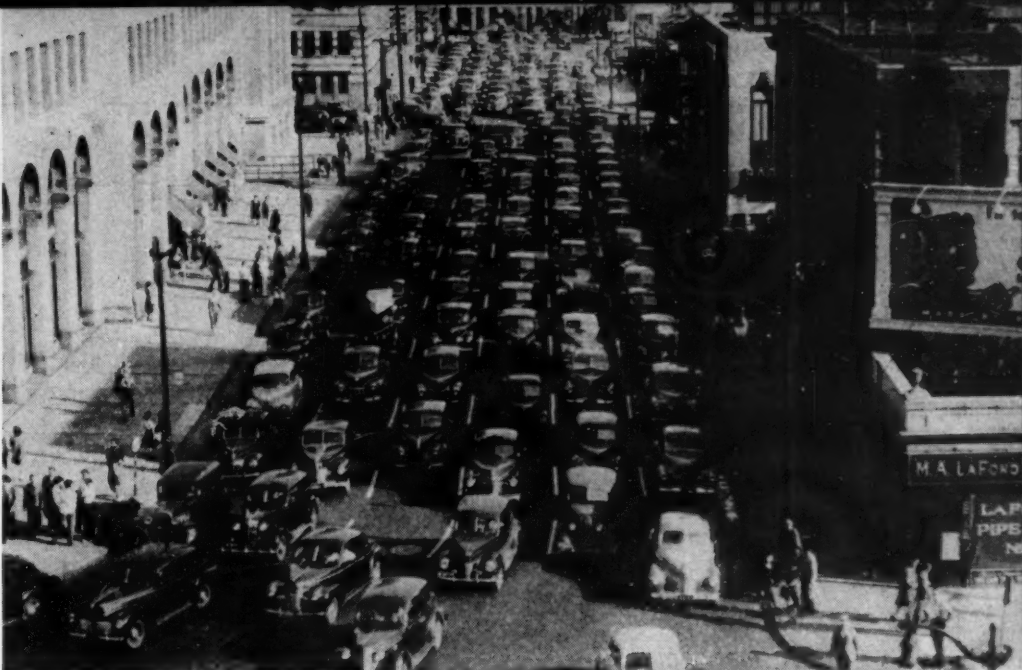
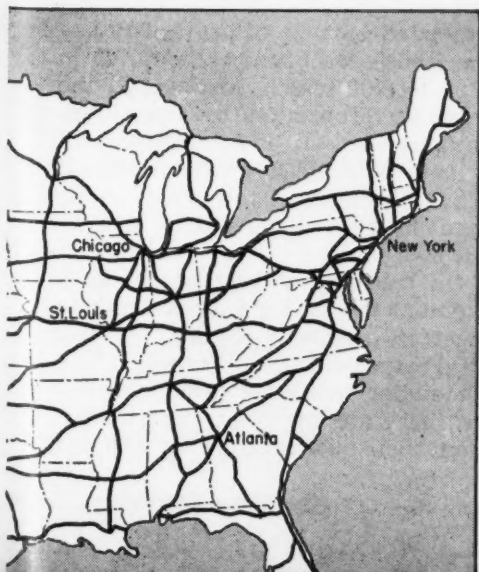
BY ITS PASSAGE of the Federal Aid Highway Act of 1944 Congress turned a switch that cast brilliant light upon a new and broad panorama of the road building scene ahead. The picture, first viewed from the high points of planning surveys conducted in 48 states, had been gradually laid on by many brushes, studiously applied. In the light of the new Federal Act it reveals the forward way far beyond the horizon as viewed from the valley of present actuality.

A purposeful march of progress toward these more distant horizons was set in motion by a concurrent resolution of the two Houses of Congress passed in the early days of last October which, finding as a fact that the war emergency had been sufficiently relieved, sanctioned a beginning upon the extraordinary program of federal-aid highway construction authorized by the earlier Act.

For immediate construction activity the October, 1945, resolution released a federal credit of \$500,000,000, available for expenditure during the fiscal year ending June 30, 1946, and the 12 months after that date. Since the credit is considered spent when it is allotted by legal agreement to specific projects, the actual construction provided for by the first \$500,000,000 fund can, and probably will, extend beyond June 30, 1947. As the federal fund must be matched with state and local funds under state control in generally equal amount, the eventual expenditure on this first program will be nearly a billion dollars.

Next July a second federal credit of \$500,000,000 becomes available for allotment, and the approximate

LOCATION OF ROUTES (below) of 34,000-mi. interregional highway system recommended by the National Interregional Highway Committee is here shown. Interstate highway system now being designated will total 40,000-mi., including most of the routes indicated.



TRAFFIC CONGESTION in large cities will be relieved by expressways. This picture, taken at the intersection of West Grand Boulevard and Second Ave. in Detroit, is typical of traffic conditions existing in many cities.

Page 79

HENRY G. SHIRLEY MEMORIAL HIGHWAY (below) is a new 4-lane divided express highway through the Virginia suburbs of Washington, D. C. During the war it speeded home-to-work movement between housing developments in the foreground and The Pentagon and Washington offices in the background. It will eventually form a part of U.S. Route 1 and the Interstate Highway System.

Photo—War Dept. Air Corps





HEAVY CONSTRUCTION EQUIPMENT WILL PLAY IMPORTANT PART

Between Indian Head, Md., and nation's Capital (above) earthmoving is resumed on road started as war project. Heavy



NEW FEDERAL APPROPRIATION for secondary and feeder roads will aid improvement of many roads like this.

FARM-TO-MARKET ROADS like this (below) are visualized in standards recommended by American Association of State Highway Officials.



billion-dollar total resulting when this is matched with state and local funds will be subject to project obligation by June 30, 1948, and actual expenditure on construction continuing for some time afterward.

Meanwhile, a third \$500,000,000 federal credit will be similarly released on July 1, 1947 and, similarly matched, will provide for nearly a third billion dollars worth of construction to be inaugurated before, and finished in a reasonable period after, June 30, 1949.

A \$3,000,000,000 Program

Altogether, the October resolution started a program of federal-state road and street construction that will involve nearly \$3,000,000,000 worth of work between now and 1950. And this is not quite all. There is presently available an unexpended balance of previously authorized federal funds amounting to \$150,000,000 which, matched in the required proportion by the states, accounts for an additional sum of nearly \$300,000,000 of combined funds, increasing the total to be spent by 1950 to more than \$3,000,000,000.

On the part of the federal government the availability of funds to meet its approximate half of this total expenditure is assured. The remainder will have to be supplied by the state highway departments from their own revenue sources and



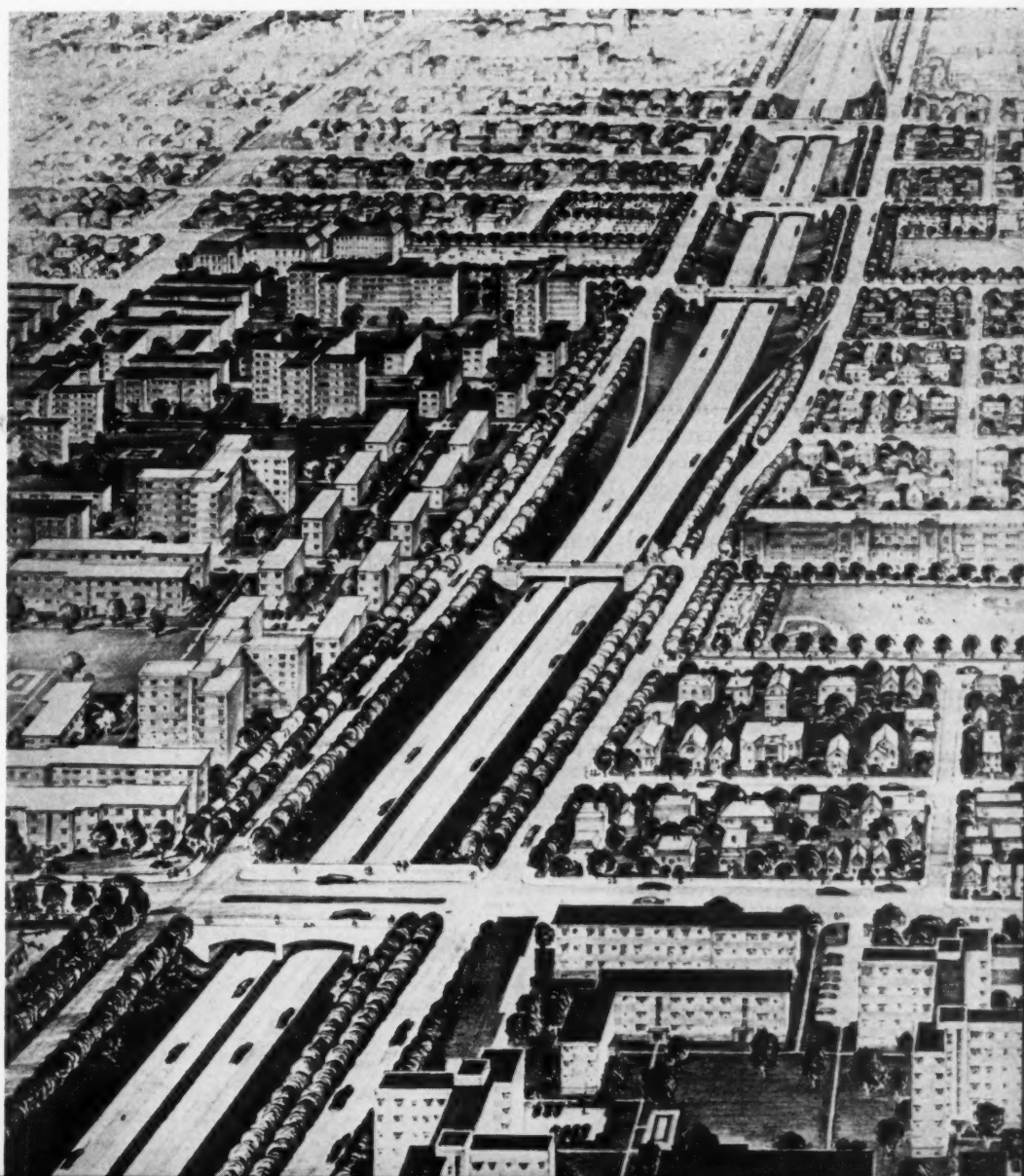
IN BUILDING ROADS INCLUDED IN NEW FEDERAL-AID PROGRAM

grading operations have been begun on parkway (above) forming link in U. S. 1 between Washington and Baltimore.

others placed at their disposal by cities and counties. The state departments start with a total unexpended balance available for construction estimated at \$650,000,000 as of Jan. 1, 1946. Road user revenues in the form of gasoline taxes and vehicle license fees, generated in increasing amounts as time goes on, will yield a large part of the remainder.

The sum of the city and county contributions, rightly to be expected, is the least certain element in the financial prospect. The two classes of subdivisions will need a substantial part of their own revenue for the construction of streets and roads that cannot be included in the federal-aid program and another part, likewise substantial, for maintenance purposes. How much they will allot to the important projects of the federal-aid program is problematical. They are likely to have for expenditure in the next four years a total of at least \$3,000,000,000.

To round out the highway budget



→
ARCHITECTURAL DELINEATION illustrates section of proposed John C. Lodge Expressway in Detroit. The 10-mi. expressway, carrying six lanes of traffic, will be completed at an estimated cost of \$30,000,000, including purchase of right-of-way.

APPORTIONMENT OF AUTHORIZATION FOR THE FIRST POST-WAR YEAR

STATE	SUMS APPORTIONED FOR			
	Federal-Aid Highway System	Secondary or Feeder Roads	Urban Highways	Total
Alabama.....	\$4,711,985	\$3,732,285	\$1,303,288	\$9,747,558
Arizona.....	3,231,050	2,234,825	262,168	5,728,043
Arkansas.....	3,854,270	3,103,100	558,221	7,515,591
California.....	9,018,749	5,162,254	8,122,233	22,303,236
Colorado.....	4,039,595	2,718,345	933,647	7,691,587
Connecticut.....	1,395,343	766,175	2,607,495	4,769,013
Delaware.....	1,096,875	731,250	204,057	2,032,182
Florida.....	3,236,627	2,168,089	1,599,641	7,004,357
Georgia.....	5,648,564	4,310,453	1,622,008	11,581,025
Idaho.....	2,785,964	1,948,442	211,799	4,946,205
Illinois.....	8,847,367	4,761,820	9,510,696	23,119,873
Indiana.....	5,402,363	3,622,366	3,065,734	12,090,463
Iowa.....	5,567,260	3,979,710	1,592,107	11,139,077
Kansas.....	5,660,742	3,973,471	1,107,219	10,741,432
Kentucky.....	4,203,011	3,405,116	1,299,529	8,907,656
Louisiana.....	3,371,110	2,524,469	1,531,578	7,427,157
Maine.....	1,948,954	1,404,017	560,538	3,913,509
Maryland.....	1,830,936	1,170,515	1,790,081	4,791,532
Massachusetts.....	2,942,968	786,683	6,612,615	10,342,266
Michigan.....	6,826,974	4,129,025	5,682,433	16,638,432
Minnesota.....	6,055,101	4,170,973	2,206,152	12,432,226
Mississippi.....	4,041,077	3,333,877	600,115	7,975,069
Missouri.....	6,660,223	4,562,550	3,151,158	14,373,931
Montana.....	4,547,996	3,107,277	307,665	7,962,938
Nebraska.....	4,476,165	3,159,246	782,776	8,418,187
Nevada.....	2,868,043	1,921,867	60,613	4,860,523
New Hampshire.....	1,096,875	731,250	475,000	2,303,125
New Jersey.....	2,863,970	1,041,395	5,527,987	9,433,352
New Mexico.....	3,636,969	2,517,619	257,261	6,411,849
New York.....	10,840,121	4,275,825	18,776,072	33,892,018
North Carolina.....	5,433,060	4,453,613	1,492,475	11,379,148
North Dakota.....	3,347,724	2,412,044	214,578	5,974,346
Ohio.....	7,904,748	4,657,668	7,539,574	20,101,990
Oklahoma.....	5,070,405	3,723,761	1,348,164	10,142,330
Oregon.....	3,728,908	2,544,582	810,873	7,084,363
Pennsylvania.....	9,185,473	5,270,332	10,517,201	24,973,006
Rhode Island.....	1,096,875	731,250	1,123,049	2,951,174
South Carolina.....	3,050,328	2,518,039	654,032	6,222,399
South Dakota.....	3,535,472	2,515,992	222,116	6,273,580
Tennessee.....	4,768,902	3,668,429	1,593,037	10,030,368
Texas.....	14,258,270	10,043,311	4,464,068	28,765,649
Utah.....	2,531,450	1,685,875	433,731	4,651,056
Vermont.....	1,096,875	731,250	211,884	2,040,009
Virginia.....	4,114,033	3,191,318	1,491,272	8,796,623
Washington.....	3,536,808	2,394,765	1,467,429	7,399,002
West Virginia.....	2,474,035	2,080,317	807,692	5,362,044
Wisconsin.....	5,434,891	3,681,127	2,654,468	11,770,486
Wyoming.....	2,795,630	1,897,080	133,049	4,825,759
Hawaii.....	1,096,875	731,250	393,416	2,221,541
District of Columbia.....	1,096,875	731,250	1,146,477	2,974,602
Puerto Rico.....	1,110,126	1,132,458	834,529	3,077,113

of these first four years, the states are likely to require at least \$1,200,000,000 for maintenance and we can probably count on a balance of \$300,000,000 to be available for additional independent state construction after the federal funds have been matched and maintenance needs have been met.

In total, the probable minimum road and street expenditure for construction and maintenance in the next four years is \$7,500,000,000, an average of \$1,900,000,000 per year, with \$700,000,000 a year going for maintenance and \$1,200,000,000 for construction, five-sixths of the latter in the federal-aid program.

If in these four years road and street construction are to be carried forward at just the normal prewar rate and the war lag of needed, but deferred, work is to be caught up, the average expenditure will have

to be substantially larger than this probable minimum—at a good guess about \$1,600,000,000.

Funds Earmarked

Whether work is undertaken at the rate determined by the lower or the higher of these expenditure figures will depend upon a number of factors, among them the volume of other construction committed, both private and public, the larger or smaller competing demand for labor and materials thus generated, and, most directly, the desires and the will of the people as expressed in a multitude of policy decisions on state and local tax rates and bond issues. In any event the location and character of work done will be powerfully affected by provisions of the Federal Act. For this Act, more definitely and generously than those that have preceded it, provides for the improvement of *secondary*, as

well as *primary*, rural roads and for arterial routes within, as well as between, cities.

Of the \$500,000,000 total authorized for the present first, and the next two succeeding fiscal years, \$225,000,000 for each year is earmarked for expenditure on the principal highways included in the 232,000-mi. federal-aid system. This part of the total provision follows the long established pattern and is available for the improvement of routes of the system inside, as well as outside, of cities.

Improvement of Urban Routes

A significant departure from the past rule is the authorization of \$125,000,000 of each year's total to be used only for improvement of routes of the federal-aid system in urban areas, which are defined as areas adjacent to, and including, cities of 5,000 population or more. The effect of the Act is to reserve this part of the federal grant fund for the improvement of major arterial routes in the larger cities and their surrounding metropolitan areas.

And, finally, the first two provisions setting apart seven-tenths of each year's fund for the construction of primary highways, the remaining three-tenths, or \$150,000,000 per year, is dedicated to the improvement of systems of the principal secondary and feeder routes, to be selected in each state.

Apportionment of Funds

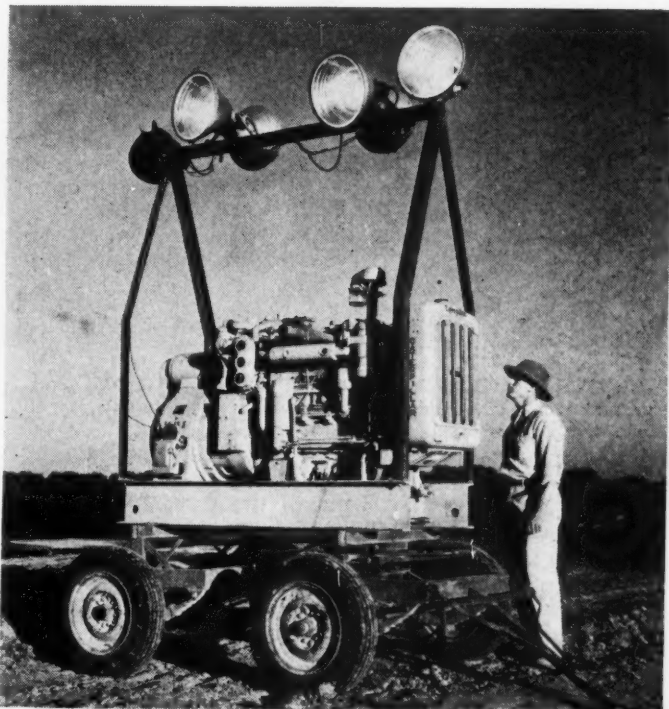
The Act requires the three separate fractions of the total fund to be apportioned among the several states, each in accordance with a different formula intended to insure an equitable division in proportion to an approximate measure of the need existent in the states as units. It leaves to the state highway departments which, jointly with the Public Roads Administration, are charged with the duty of administration, the fair and reasonable application of the apportioned sums within each state. In the case of the funds provided for general use on the federal-aid system this is an accustomed task. In the case of the urban-area funds it imposes the not-too-simple problem of a satisfactory division among the cities of each state; and in the case of the funds for secondary and feeder roads it presents a similar problem of acceptable division among the counties. A satisfactory solution of these new problems will be found
(Continued on page 164)

HOW

They Did It

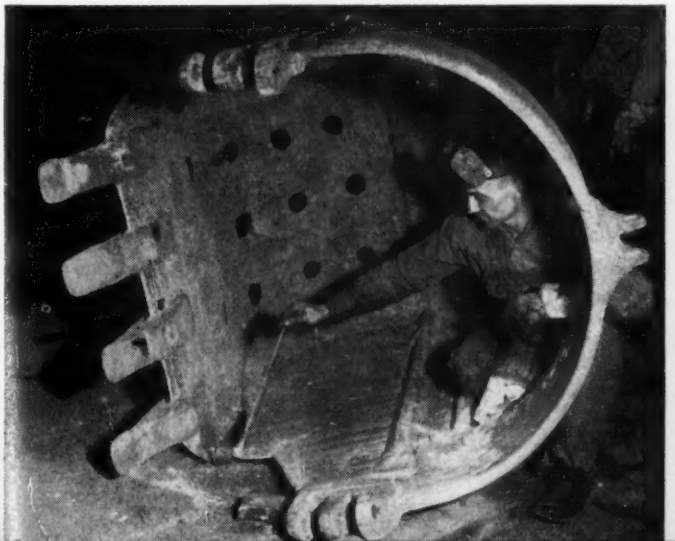
CONSTRUCTION DETAILS

*For
Superintendents and Foremen*



PITCH OF TEETH of dragline bucket (below) is increased by cutting slot in each side of unit, spreading bucket lip apart with jack to desired angle and then arc welding steel plate into cutout section.

Lincoln Electric Photo



HYDRAULIC CAR TILTER is used in New York's Battery-Brooklyn Tunnel to unload tons of muck and rock into derrick cradle which lifts debris 90 ft. to surface. Construction on \$84,000,000 vehicular tunnel has been resumed at Manhattan end by Mason & Hanger Co. after 4-yr. delay due to war. George H. Flinn Corp. is again at work on shield-driven tubes at Brooklyn end.

NIGHT OPERATIONS on Mississippi River levee construction near Claryville, Mo., are lighted by floodlights mounted on Caterpillar diesel 15-kw. electric set by contractor, Luhr Bros. Construction Co., Columbia, Ill.



SLEEVE-LIKE LENGTH OF TUBE soldered or welded to nozzle cap of calking gun eliminates need for cleaning after each loading. Gun at left has flared-edge brass tube 5 in. long and 2 3/8 in. in diameter to provide clean grip, while gun at right lacks this protection and must be wiped.—
From Andrew Vena.



Page 83

FIRST FLARED-END PRECAST CONCRETE CATTLE PASS (below) goes into service on section of Minnesota Trunk Highway 100 constructed by A. Guthrie & Co., contractor, St. Paul, just north of Twin Cities. Manufactured and installed by Elk River Concrete Products Co., Minneapolis, pass is 68 ft. long and consists of eight 6-ft.-long sections and two 10-ft.-long sloping ends. Inside dimensions are 4x6 ft. If highway is later widened, tunnel can be extended in length without loss of materials.





SAND CUSHION on graded gravel road is struck off by motor patrol and thoroughly wetted with hose spray in preparation for concrete paving.

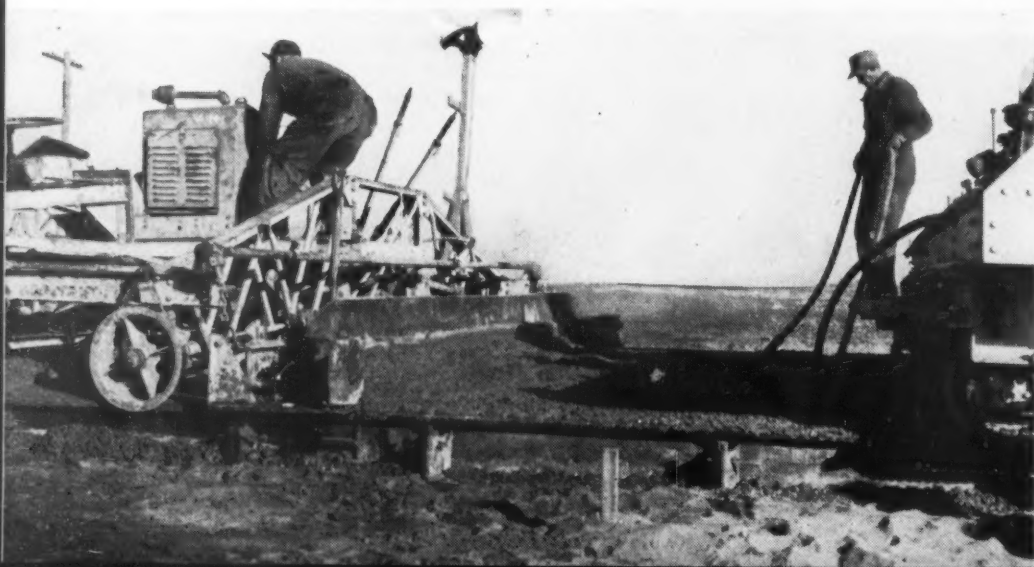


TWO-BATCH TRUCK delivers proportioned dry ingredients for 29.7-cu. ft. batch of air-entrained concrete to paving mixer traveling on subgrade.

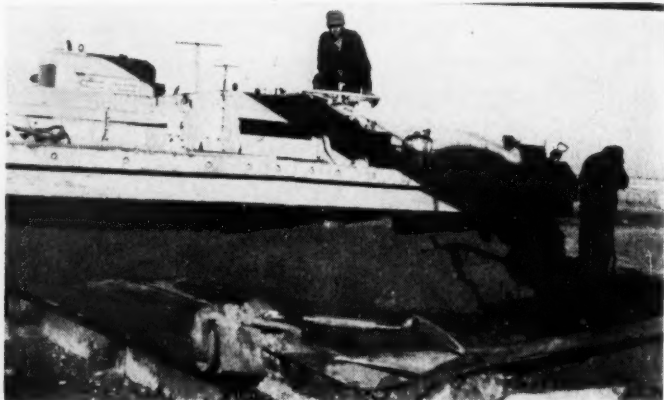
APPLYING MODERN CONCEPTS of concrete pavement design, the North Dakota State Highway Department last fall started construction of unreinforced air-entrained concrete slab with closely spaced contraction joints, but without expansion joints, on sand cushion spread over a stable foundation of traffic-bound gravel for 5.84 mi. of U.S. 81 (state route 13) west of Wahpeton. As agent and operator for S. J. Groves & Sons Co., Minneapolis, holder of a \$253,000 contract signed Sept. 6, the Woodrich Construction Co., of the

Page 84

FLEXIBLE-SHAFT VIBRATOR (below) carried on spreading machine vibrates concrete adjacent to edge forms ahead of two-screed finisher.



North Dakota Builds Unreinforced Pavement of *Air-Entrained Concrete*



TRANSVERSE SPREADING MACHINE riding on steel forms distributes air-entrained concrete mixture evenly across subgrade. Pavement contains no reinforcing steel or expansion joints.

same city, laid nearly 2 mi. of the pavement, of 8-in. uniform thickness, 20 ft. wide, between Oct. 6 and Oct. 22, when lateness of the season and short working days caused operations to be suspended for the winter. Contraction joints 2½ in. deep were formed on the longitudinal center line and transversely at 15-ft. centers.

Air entrainment, as measured by weight reduction of the concrete, is specified by the highway department to be within the range of 3 to 6 percent. On this project, the department engineers aimed for a weight re-

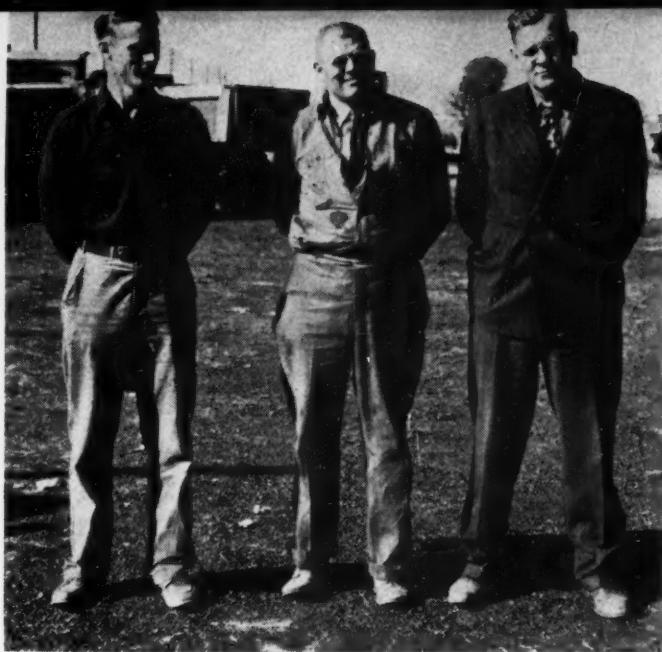
NORTH DAKOTA HIGHWAYS are administered by N. O. JONES, commissioner, State Highway Department.



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PAVING JOB is directed for North Dakota Highway Department by **HORACE H. MULLER** (left), resident engineer, standing here with **C. E. RYBERG**, plant superintendent, and **ALBERT S. ANDERSON**, office manager, Woodrich Construction Co.

duction of 4 percent. The air entrainment was produced by intergrinding the proper proportion of Vinsol resin with the cement clinker at the Duluth, Minn., mill of the Universal Atlas Cement Co. Weight reduction is checked by weighing samples of the concrete mix in a calibrated container, holding about $\frac{1}{2}$ cu. ft., during each day's run. When the concrete mix remains consistent throughout the day four or five samples give the required control. If variations occur in the mix, additional samples are weighed.

Once the job settled down to steady operation, weight reduction of individual samples held close to an average of 4.1 percent. During the first paving days, the weight reduction had been lower, with individual samples varying little from an average for those days of 3.1 percent. The overall average for the entire fall run was 3.6 percent. Cement content of the concrete was 6 sacks per cu.yd., and the slump averaged about $2\frac{1}{2}$ in. Cylinder tests of the concrete have averaged 3,409 psi. at 7 days and 4,605 psi. at 28 days.

Concrete Batch

Paving started with a Rex 27E single-drum mixer 10 years old. Taking advantage of the allowable 10 percent overcharge, the batch volume was set at 29.7 cu. ft. Aggregates were separated in three sizes. Gravel came in two gradations, 2-in. to $\frac{3}{4}$ -in. and $\frac{3}{4}$ -in. to No. 8. Fine aggregate was graded sand, 100 percent passing $\frac{3}{8}$ -in. screen. These aggregates had average moisture contents about as follows: $2\frac{1}{2}$ percent in the sand, 2 percent in the intermediate size, and 0.66 percent in the coarse.

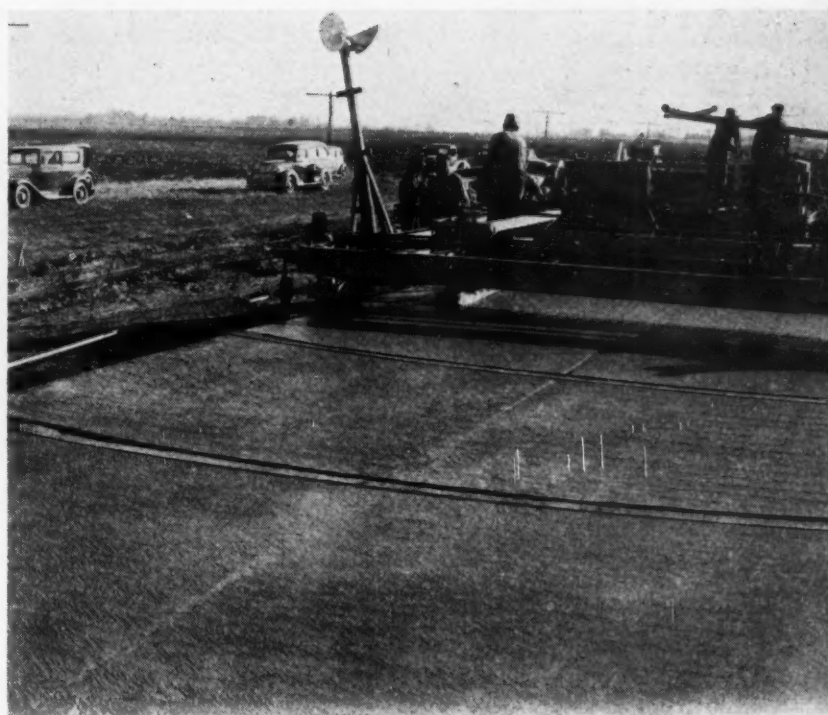
Including moisture in the aggregates, actual average weights of a 29.7-cu. ft. batch were: cement, 620 lb.; sand, 1,270 lb.; intermediate gravel, 1,369 lb.; coarse gravel, 905 lb. Total water, including moisture in the aggregates, for a 29.7-cu.ft. batch was about 31 gal., producing an average slump of about $2\frac{1}{2}$ in.

Weight of Concrete—To determine the weight of concrete without air entrainment as a basis for controll-

(Continued on page 160)

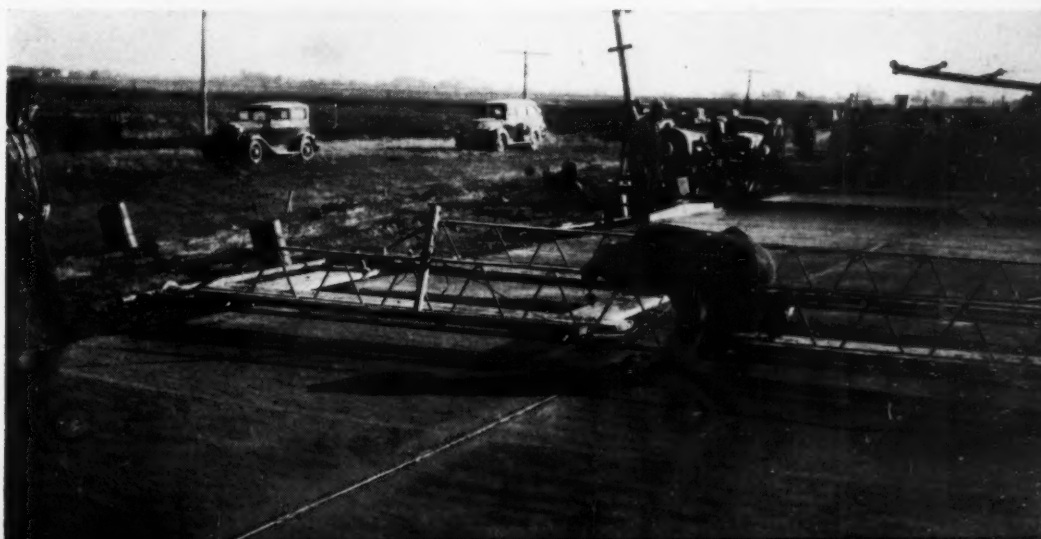


FLOW-HANDLE JOINT KNIFE cuts transverse contraction joints in pavement, while wheel cutter attached to rear of finishing machine, at right, cuts longitudinal center-line contraction joint.



BEHIND LONGITUDINAL FLOAT, surface of pavement free from laitance is given double belting which produces uniform pattern indicating cohesive quality of concrete.

LACK OF BLEEDING permits joint edging and final finish of air-entrained concrete (below) to proceed close behind paving mixer even on chilly morning.





HEAVY GRADING IN RUGGED TERRAIN near Charleston, W. Va. prepares site for three bituminous-surfaced runways of Kanawha Airport. Largest fill on project at mid-section of Runway No. 1 is 230 ft. from the toe of slope to edge of runway. Maximum cut, about 267 ft., is on Runway No. 2, just off picture to right.

10,000,000-Yd. Earthmoving Job Levels Hills for West Virginia Airport

By L. S. WESCOTT

Assistant Chief Engineer,
Harrison Construction Co.,
Pittsburgh, Pa.



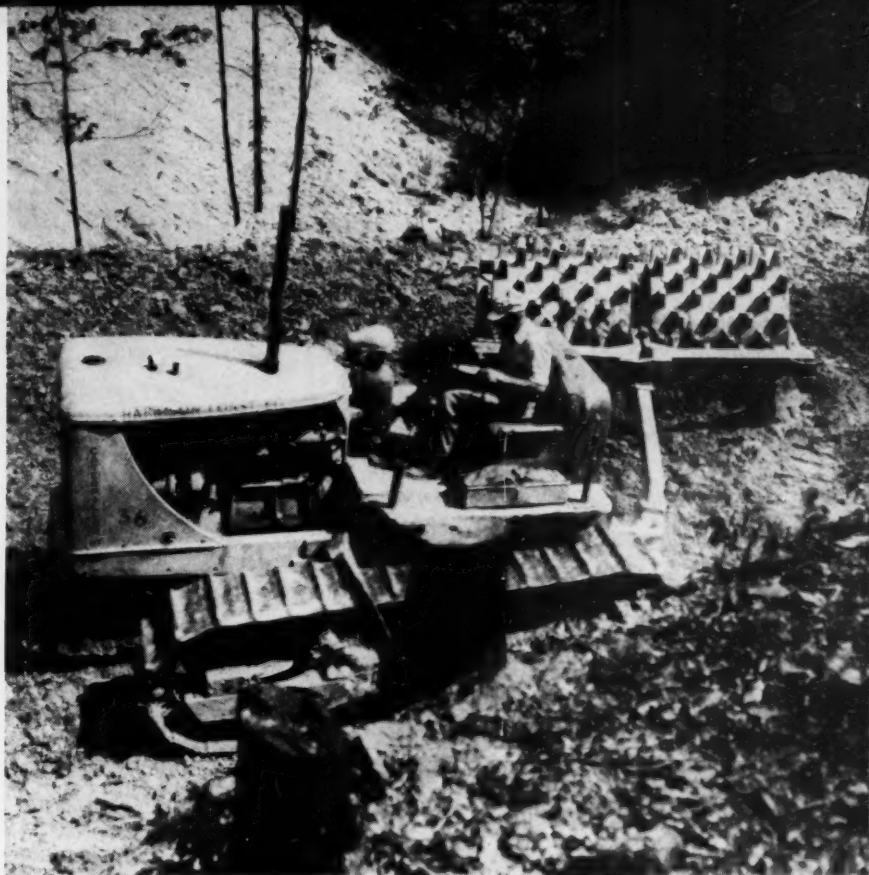
METHOD OF HANDLING ROCK to be crushed for paving base is discussed by L. S. WESCOTT, author of this article, and R. TRUZZIE, superintendent for Harrison Construction Co., Pittsburgh, Pa., holder of grading contracts on project.

UNUSUALLY LARGE EARTHMOVING QUANTITIES are involved in preparing a site for Kanawha Airport in the rugged terrain 3 mi. northeast of Charleston, W. Va. The grading required on two contracts held by the Harrison Construction Co., general contractor, Pittsburgh, Pa., totals slightly more than 9,700,000 cu.yd.

Extraordinary depths and quantities of both cuts and fills are being encountered in grading operations



KANAWHA AIRPORT at Charleston, W. Va., is being built under jurisdiction of the Kanawha County Court, composed of three members, CARL C. CALVERT, MONT L. CAVENDER and J. G. CARPER. Counsel for the County Court is DALE CASTO. The airport director, FRED C. ALLEY, represents the County Court and is responsible for the early planning and location of the airport. Whitman, Requardt & Associates of Baltimore, Md., consultants, developed the master plan. Their engineers in charge of Contract No. 2 are JOSEPH J. DONOHUE, G. R. HEVELL and S. R. NEID. The New York office of Civil Aeronautics Administration is in charge of Contract No. 3 and subsequent construction. R. M. BROWN, chief of airways engineering section, New York Region, and W. B. HAWKINS, resident engineer, supervise Contract No. 3. A. H. HATFIELD, assistant airways engineer, represents the Washington, D. C. office of CAA. For the Harrison Construction Co., contractor, R. TRUZZIE, superintendent, is in direct charge of Contracts Nos. 2 and 3, and M. W. WISE is vice president and general superintendent.



EARTH OVER ROCK-FILLED BENCH is compacted in 8-in. layers by sheepfoot rollers.

on three mile-long runways and an administration area. The largest fill, midsection of Runway No. 1, contains 2,700,000 cu.yd. of earth and rock and is 230 ft. from toe of slope to top of runway. An extreme range of 450 ft. from the highest point in the cut section to the toe of the fill at this point provides a grueling test for excavating equipment.

Airport Serves Industrial Area

—Kanawha Airport will serve the metropolitan area around Charleston, the county seat of Kanawha County and the state capital. This area contains one of the largest concentrations of chemical industries in the country, is a center for the southern West Virginia coal, oil and gas fields and has a population of more than 150,000.

Commercial airlines have been unable to land at Charleston since

May, 1942, when Wertz Field, the old airport, was taken over as the site for a plant in the government's war time synthetic rubber program. Wertz Field, located 6 mi. northwest of Charleston, had the undesirable features of being situated along the Kanawha River at the foot of surrounding hills, and of being adjacent to a number of manufacturing plants. These disadvantages were apparent as long ago as

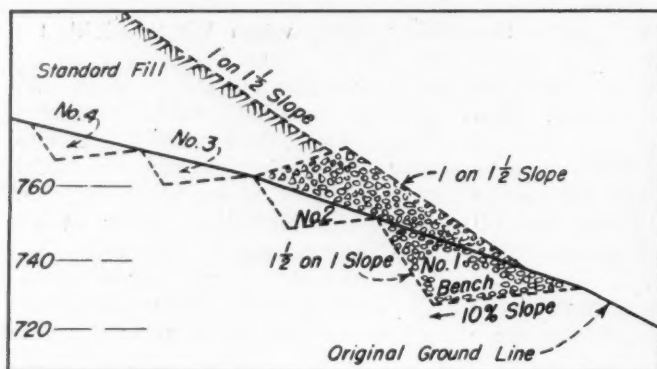
Page 87

DIFFERENCE IN ELEVATION IS 450 FT. (below) between highest point in cut section and toe of fill at midpoint of Runway No. 1. Caterpillar D8 bulldozer in right foreground is constructing rock bench to stabilize fill placed on steep slope.





EARTH FOR 230-FT. FILL IS HAULED in tractor-drawn 25- and 22-yard carrying scrapers. Fleet of nineteen 12-yd., four 22-yd. and six 25-yd. scrapers and eight Tournapull units is used for earthwork. Rock, and mixed earth and rock, is moved in Euclid 12-yd. end-dump trucks, Maxi 25-yd. side-dump trucks and Caterpillar DW10 wagons.



BENCHES FILLED WITH ROCK 1 to 6 cu.yd. in size secure toe of slopes under fills placed on ground having slopes steeper than 1 on 3. Shown here is cross-section through typical bench.

Page 88

ROCK AND EARTH CUT SECTION (below) is leveled by 22- and 25-yd. carrying scrapers to final elevation of Caterpillar No. 12 motor grader in foreground. Location is point on Runway No. 2, 500 ft. south of intersections of Runways 1 and 2.



1934, when the search for a new airport began.

Comparatively level areas around Charleston, found only in the river bottoms, were preempted long ago for municipal and industrial development. Sites as far away as 30 mi. were studied. Construction costs, property damages and inaccessibility eliminated one after another until a survey in the locality known as Coonskin Ridge, 3 mi. from downtown Charleston and at a 400-ft. higher elevation, provided a feasible site.

Financed by Many Governmental Agencies—Airport construction in the hilly terrain at the site selected is an expensive undertaking. Financing of the Kanawha project has been marked by cooperation of nearly every interested governmental agency. The city of Charleston developed the first plan for Kanawha Airport; the state aided the



NEARLY EVERY TYPE OF EARTHMOVING EQUIPMENT, aggregating 226 pieces, is used on Kanawha project grading operations. Part of 226-machine total is shown here parked on partially completed fill at mid-section of runway No. 1. Finish grade is 107 ft. below top of hill at upper right of photograph.



LOADING AREA FOR TRACTOR-DRAWN CARRYING SCRAPERS is cleared of roots by Caterpillar D8 tractor. Usual clearing method used on Kanawha project is to uproot with bulldozer, load by crane on to 12-yd. Euclid end dump truck and haul to waste area.

survey and is constructing a new access highway; the county government purchased 743 acres of land from general funds and, through a people's bond issue of \$3,000,000 voted in 1943, provided funds for thorough study of the project by consulting engineers, and for construction of sufficient facilities to begin operations.

Operating revenues were to furnish funds for completing the construction work at a later date. However, passage of the bill P.L. 61 by the 79th Congress permitted the federal government to assist such airport work, and provided an appropriation of \$2,750,000 to be administered by the Civil Aeronautics Administration of the Department of Commerce.

Three Contracts Awarded — In
(Continued on page 186)



FILL IS LEVELED BY BULLDOZER preparatory to compacting by sheepsfoot rollers and Buffalo-Springfield 13-ton three-wheel roller. Equipment is refueled from 1,000-gal. tank truck, in left background of picture. Large rocks in foreground are bulldozed into piles to be broken by cranes with drop weights.

SECONDARY BLASTING IS ELIMINATED by use of drop weights (below) on fleet of truck-mounted cranes. Weights of 1,500 lb., first used, are now supplanted by more efficient 4,500-lb. weights for breaking rocks into 24x32-in. sizes for primary crusher.

REMOVAL OF EARTH AND ROCK MATERIAL (below) from ridges at center area of project by Lorain shovel and Caterpillar DW10 wagons brings original elevation of approximately 1,042 to finish grade of 980.





FOR WIDENING PAVEMENT trenches are first excavated along each side by blade of motor patrol grader.

How Florida Reconditions and Widens *Limerock Base Roads*

By NORMAN L. BRYAN, JR.

Division Engineer, State Road Department of Florida, Deland, Fla.



NEW LIMEROCK MATERIAL is spread by dump-truck for use in upper course of widened and reconditioned pavement.

DURING the 1920's the State Road Department of Florida and the various counties constructed many miles of road in what might be termed the initial program of modern roads. Prior to that time the principal road construction was confined to cities and suburban areas, with occasional construction of 9-ft. width rural roads designed principally to "get the state out of the mud." In the 'twenties the widths of roads varied from 14 to 20 ft. As the department increased in size, due principally to increased revenue from gasoline taxes, it assumed responsibility for the maintenance of many of the county-built roads which now, together with roads constructed by the state, comprise a system of state-maintained roads totaling 8,500 mi.

In the construction of this initial road program materials native to Florida were largely utilized. Among them was Florida limerock, mined principally in the Ocala and Miami regions of the state. The roads constructed with this material as a base in the 'twenties are now ready for reconditioning, both as to width and thickness. The thickness in general was 6 in. whereas now, on the main system of roads, an 8-in. minimum thickness is required. On this system a minimum width of 22 ft. is desired instead of the old 16- or 18-ft. widths. In instances where traffic justifies, the width is increased to 24 ft.

It is understandable that roads constructed 20 or more years ago have become rough and the surfaces, both longitudinally and transversely, are warped to such an extent that a new riding surface and grade is mandatory. Maintenance

Page 90

FINISHING OPERATIONS (below) involve use of motor patrol grader, water truck and three-wheel, 10-ton rollers for consolidating limerock.



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WINDROW OF MATERIAL from widening trench is formed alongside road. Existing limerock base is scarified and spread to new width.

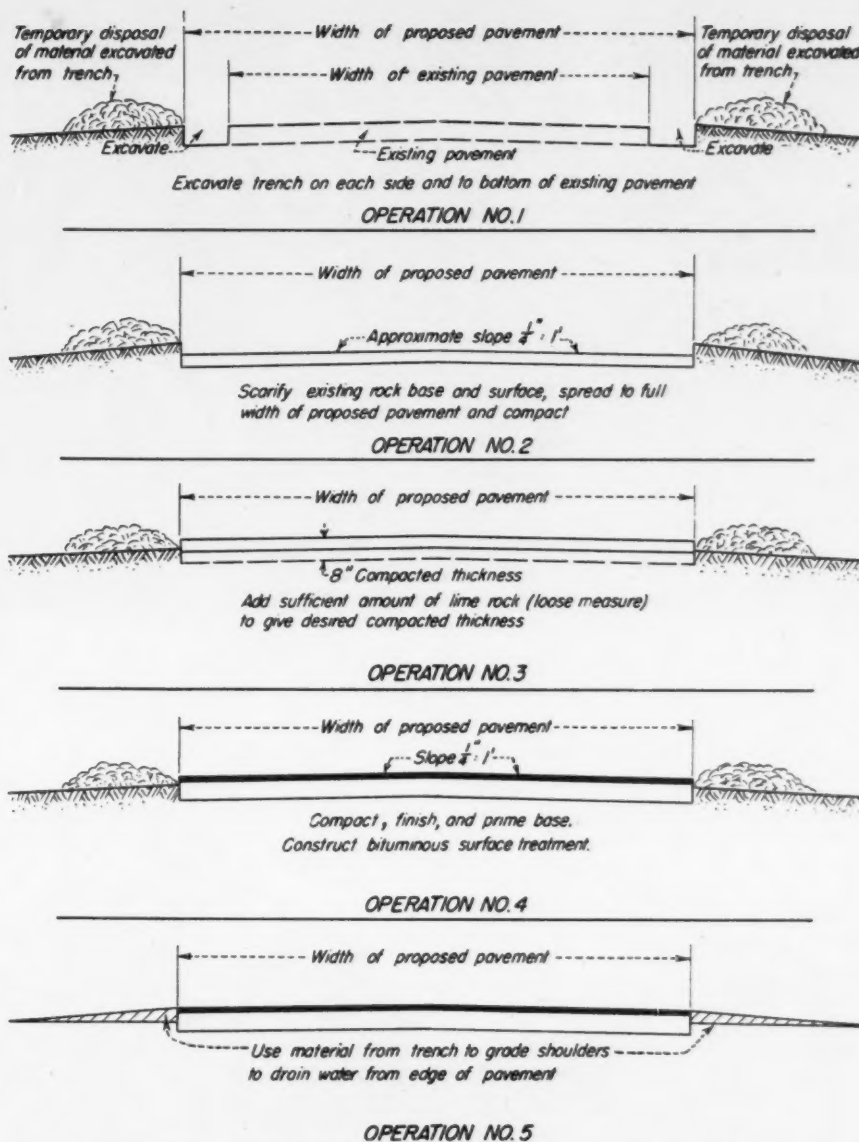
of these older roads is year by year absorbing a greater part of the allotted maintenance funds and reconditioning of the pavements is considered economical.

During the last 10 years the department has developed an almost standard method of reworking and widening old limerock base roads which is used if the alignment, general grades, and other criteria of a modern road are satisfactory. Several hundred miles of roads have been modernized in this manner. This method includes the following operations illustrated in the accompanying drawing:

- (1) Excavation of trenches along side of existing base to receive widened section.
- (2a) Blading existing surface into these trenches; (b) Scarifying of existing base and spreading uniformly to new widths to form lower course for new base.
- (3a) Addition of new limerock for upper course; (b) Compaction and finishing of new base.
- (4a) Priming of finished base; (b) Application of bituminous surface course.
- (5) Dressing of shoulders.

Sequence of Operations

In the first operation the trenches to receive the widened section are excavated to the same depth as the existing pavement. This excavating is usually done with a motor patrol grader whose blade is tilted to an acute angle. Care is taken in this



SEQUENCE OF OPERATIONS in widening and reconditioning limerock base roads with new bituminous surface comprises five steps.

operation only to shave the edge of the old base and keep the outer edge of the trench as nearly vertical as possible. As no form boards are used in this type of construction,

the outer edge of the trench constitutes an earth form.

The existing surface treatment is then scarified and disked or other-

(Continued on page 142)

SURFACE TREATMENT (below) is here completed atop reconditioned limerock base.



Dual-Lane Highway

Involves Heavy Grading, Unreinforced Concrete Pavement and Bridge

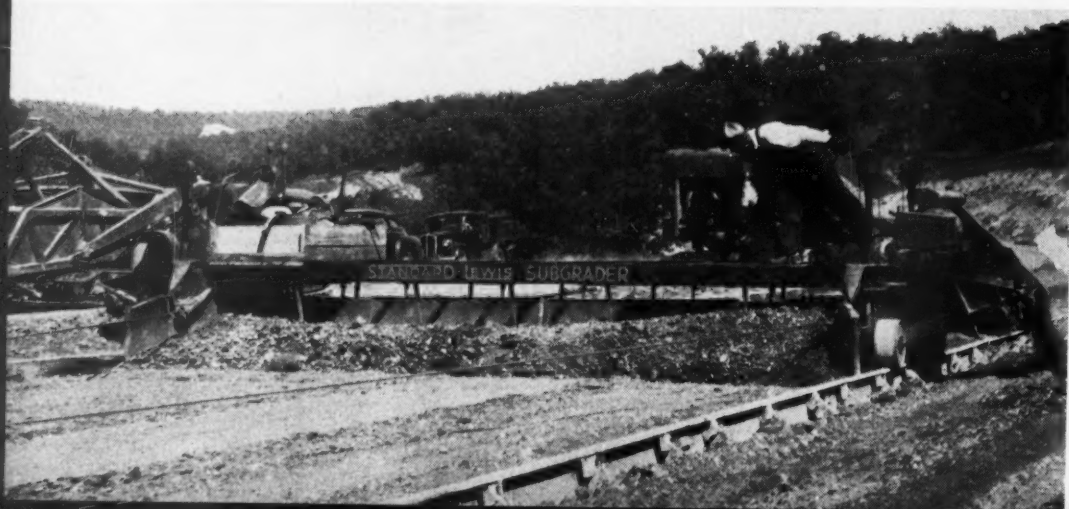
By J. J. CORRETT, Engineer of Construction, Missouri State Highway Department



ROCK CUTS on project had maximum depth of 95 ft.

→
FINISHING OF SHOUL-
DERS and dividing
strip between dual
roadways was speeded
up by use of Tourn-
pull and scraper.

SUBGRADE (below) is accurately shaped by tractor-hauled machine riding on forms and equipped with belt conveyor for casting excavated earth beyond forms.



A RECENTLY COMPLETED PROJECT on U.S. Route 66, in the vicinity of Fort Leonard Wood, Mo., consisted of grading, a bridge over Piney River and dual 22-ft. cement concrete pavements with dividing strip varying from 6 to 54 ft. in width. This improvement, 4.7 mi. long, part of the interregional system, traverses scenic but extremely heavy rolling terrain of the Ozark uplift.

Grading—Excavation and grading quantities consisted of 376,604 cu. yd. of material classed as earth; 289,030 cu. yd. of ledge rock; 426,757 cu. yd. compaction of embankments and cuts; and 171,121 cu. yd. of $\frac{1}{4}$ -mi. overhaul. Rock cuts and in some instances unsuitable subgrade materials were backfilled with top soil. One of the rock cuts was 95 ft. deep.

Missouri specifications require embankments constructed in 6-in. lifts (except rock fills) and compacted at optimum moisture to 95 percent of standard density. Compaction is obtained with sheepsfoot rollers.

Equipment consisted of power shovels, heavy trucks, hydraulic and cable-operated scrapers, bulldozers, tractors, motor graders,

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TRAIN OF CONSTRUCTION EQUIPMENT for paving dual 22-ft. roadways of 9-in. thick concrete slabs includes 34-E paver, trucks, spreader equipped with vibrator, double-screed transverse finisher and longitudinal finisher.

wagon and hand compressed air drills. Grading contractors were O'Dell & Riney Construction Co., Kirkwood, Mo., and Fred Weber, Jr., St. Louis.

Piney River Bridge

All footings for Piney River Bridge were founded in rock. Holes were sheeted and the excavation to rock elevation was removed by a crane. The concrete structure consists of a series of spans in the following sequence: one 45-ft. deck girder, one 100-ft. arch, and 160-ft. central arch, one 100-ft. arch and four 50-ft. deck girders. The floor provides two 26-ft. roadways with a 6-ft. median strip, the beveled sides of which are white cement concrete with regular serrations to produce reflectorizing effect for night traffic on either roadway.

Each roadway floor section on arch spans is supported by two 6-ft. wide arch rings secured laterally by concrete tie beams. To conserve time, labor and material, the falsework and forms for arch rings were constructed to facilitate lateral transfer of forms and centering to each of the four rings in each arch span. Forms for all exposed surfaces were made of $\frac{3}{4}$ -in. plywood secured to proper line by 2x4-in. studding on 18-in. centers and 2x8-in. walers.

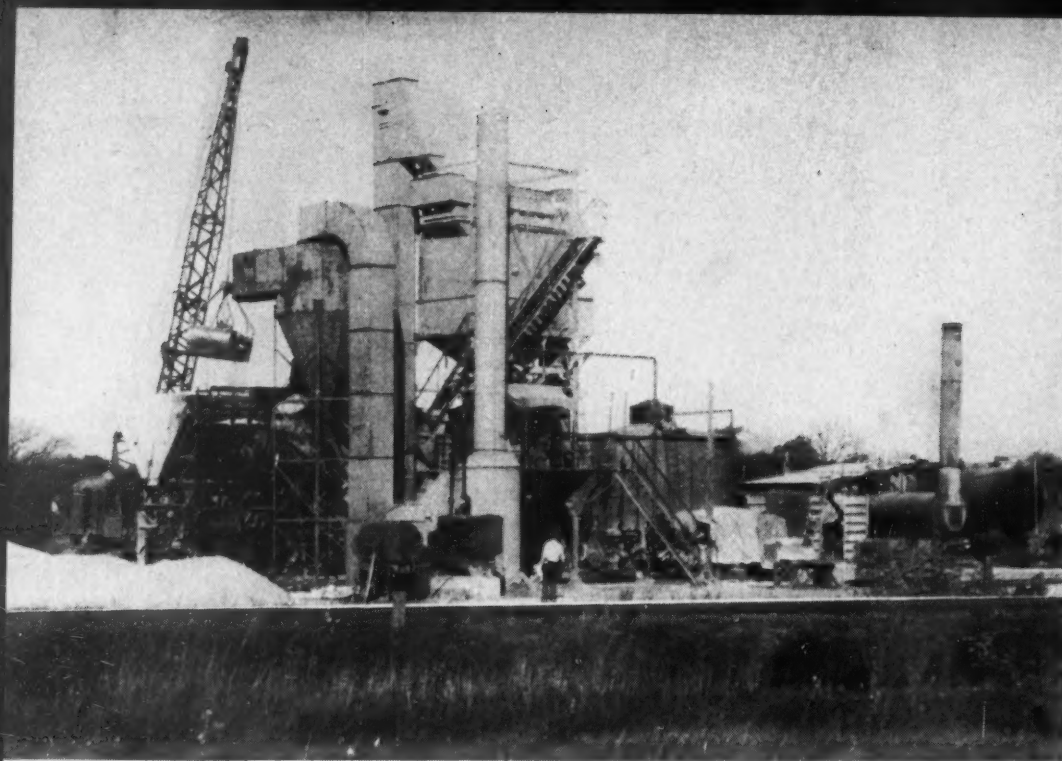
Specifications required weight-
(Continued on page 136)



MULTIPLE-SPAN CONCRETE ARCH BRIDGE carrying two 26-ft. roadways and 6-ft. median strip formed part of project.

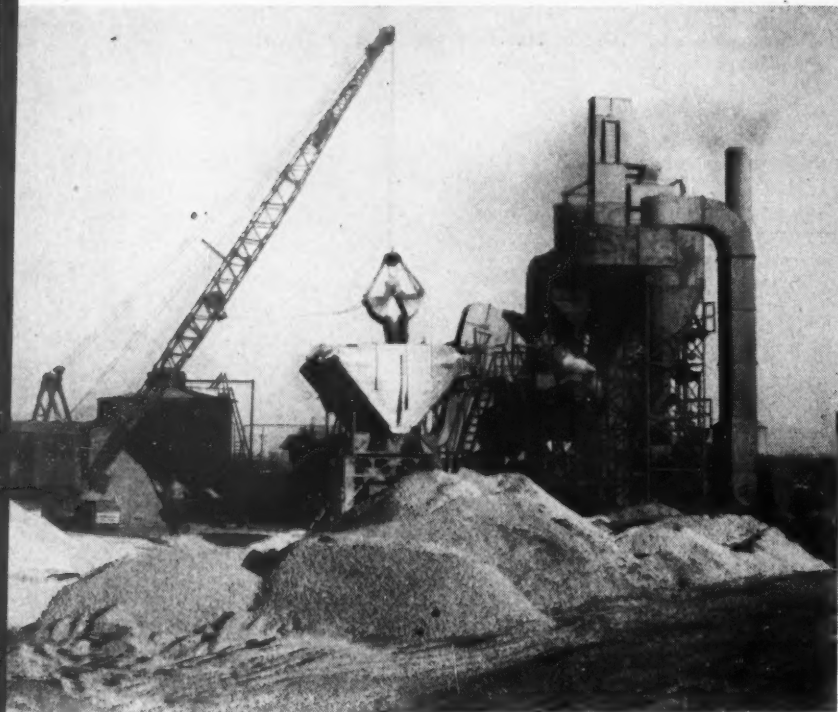
CURB CONCRETING by agitator trucks (below) was aided by use of cable-hauled sled, attached to finishing machine, and serving as inside form. Spool for cable storage (indicated by arrow) facilitates control of movement of sled.





ASPHALT PLANT of modern design with hot-elevator capacity of 137½ tons per hr. produces 2½-ton batches of binder mix and top mix for resurfacing project.

Special Refinements Aid Operations on *Illinois* Resurfacing *Job*



REFINEMENTS DEVELOPED by the Illinois Division of Highways and its contractors during 4 years' experience in resurfacing some 600 mi. of old pavement served White Consolidated, Inc., of Chicago, to good purpose last fall in putting a 2½-in. two-course hot-laid asphaltic concrete top on 18½ mi. of State Highway 17, east and west of Dwight. Mixture incorporating fine, dense-graded aggregates were produced for both 1½-in. binder course and 1-in. surface course by a modern, high-capacity mixing plant set up by the contractor on a railroad siding in town, near the center of the job. On the highway, two self-propelled tamping-leveling finishers laid the hot material in half widths on top of existing 18-ft. concrete pavement, keeping the road open to traffic at all times. By adjustment of cutoff plates of the finishers and by use of special plate attachments at the rear of the machines, the paving crew formed a smooth longitudinal center joint and shaped the outer edges of the bituminous material to uniform profile with a minimum of labor.

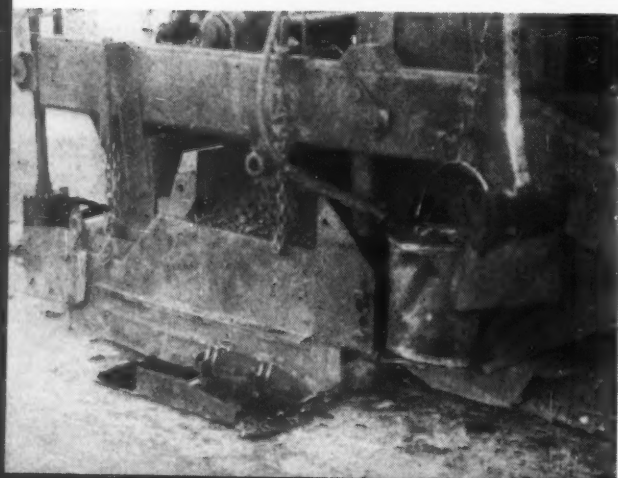
An accompanying table gives the mix proportions for binder and for wearing course. Temperatures of

Page 94

CUTOFF PLATES (below) of finishing machines are set to apply 8-ft. 9-in. width of asphaltic concrete in each 9-ft. lane on binder course. For surface course, width of spread is adjusted to 8 ft. 10½ in.

↑
CRANE OPERATING
1½-YD. **BUCKET**
charges hopper over
boot of cold elevator
with crushed stone,
coarse sand and fine
sand.

TAMPING-LEVELING FINISHER (below) traveling on concrete pavement receives 12½-ton load of asphaltic concrete from insulated truck for 1½-in. binder course.

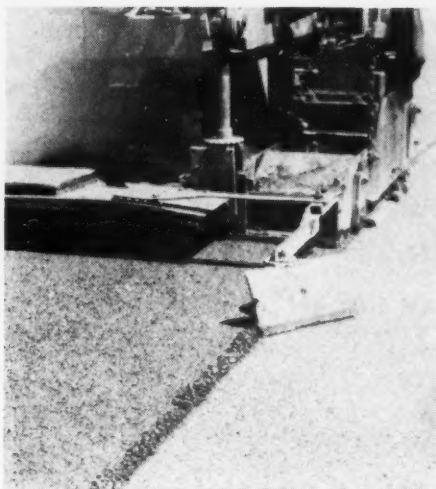




TWO ROLLERS, 10-ton three-wheel followed by 8-ton tandem, compact asphaltic concrete in both binder course and surface course.



EDGE PLATE ATTACHMENT at rear of finisher shapes edge of bituminous concrete resurfacing on both binder course and top course.



TRAILING PLATE of type used on this project in making center joint scrapes excess material off completed lane on to hot asphaltic concrete of adjacent lane, being laid by finisher, where material is rolled in, helping to form tight joint of uniform appearance.

**ASPHALTIC CONCRETE
FINE DENSE-GRADED AGGREGATE TYPE
ILLINOIS I-11**

Proportions of Mixture

Material	Percent
SURFACE COURSE	
Passing 1/2-in. screen, retained on No. 10	53
Passing No. 10, retained on No. 200....	35
Passing No. 200.....	6
Bitumen	6
BINDER COURSE	
Passing 1-in. screen, retained on 1/2-in..	35
Passing 1/2-in., retained on No. 10.....	32
Passing No. 10.....	28
Bitumen	5



ALTERNATE METHOD employed formerly on other projects turns scraper plate to move excess material away from center joint on to completed lane, where material is picked up and removed by hand with broom and shovel.

the mixture at the plant were about 280 deg. F. for binder and 320 deg. for top. Temperature drop between the plant and the paving machines averaged about 10 deg. On the first half of the job, west of Dwight, an asphalt of 70-85 penetration was used. For the second half, laid in cool October weather, a softer as-

phalt of 85-100 penetration was employed. Density of the mixtures is indicated by averages to Oct. 19, when data for these notes were obtained, of 109.75 lb. per sq.yd. per in. of thickness for binder and of 111.09 lb. for surface course.

Binder course material was mixed 5 sec. dry and 30 sec. wet, and surface course material was mixed 15 sec. dry and 30 sec. wet in a 5,000-lb. pugmill mixer of a Simplicity Model S-100 asphalt plant. The cycle is automatic. After the operator has weighed the materials on Kron dial scales and pressed the

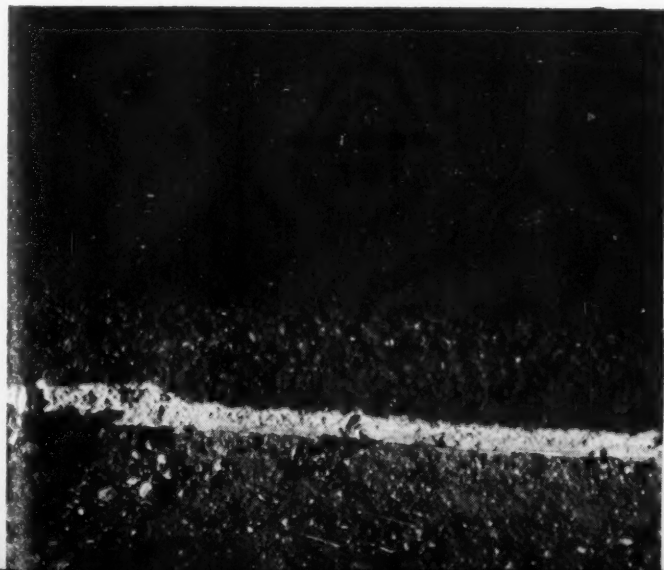
timer button, an automatic timer controls operation of the gates on the weigh hopper, asphalt weigh tank and mixer by solenoid valves and steam rams.

At Dwight, a Northwest crane with a 1 1/2-yd. clamshell fed materials to the hopper over the cold
(Continued on page 129)

Page 95

COMPLETED EDGE of asphaltic concrete resurfacing on top of existing portland cement concrete slab (below) is formed by edge plate attachment on finishing machine with surplus material from surface course. In laying top course, end plate of finisher is raised slightly to deposit small quantity of additional material along edge.

JUST AFTER SUNSET, in fast-vanishing October twilight, camera catches these three men (below) at asphalt plant: (Left to right) H. E. AKINS, plant foreman; E. E. HAGGLUND, resident engineer, Illinois Division of Highways; and JESS GREEN, superintendent, White Consolidated, Inc.



Rubber-Tired Tractor-Scrapers

Spread Gravel on MEXICAN HIGHWAY



SNATCH-LOADING in old river bed, rubber-tired tractor-scraper unit picks up load of gravel for long haul to section of Pan American Highway in Mexico.



FAST-TRAVELING UNIT completes round trip cycle of more than 20 mi., including loading and spreading, in about one hour.

LONG-HAUL GRAVEL has been transported up to 20 kilometers (about 12½ mi.) from an old river bed and spread in 8- to 10-in. lifts by two Tournapulls on a new section of the Pan American Highway in Mexico. This section, 95 km. (nearly 60 mi.) in length, is being completed by Constructora "El Aguila" S. A., one of the larger contractors in that country. The contract, which forms part of the extension of the highway south of Mexico City, between Tehuantepec and Niltonpec, toward the Guatemalan border, includes both grading and graveling. Grading involves an average of 15,000 cubic meters per km. (about 31,500 cu.yd. per mi.),

(Continued on page 132)



GRAVEL is spread evenly to desired depth of 8 to 10 in. on graded road by pneumatic-tired scraper unit at end of 12-mi. haul from pit.



POSTWAR EQUIPMENT

on Parade

A special pictorial section illustrating new developments in construction equipment

On these pages *Construction Methods* presents new equipment which can be counted upon to increase construction output during 1946 and the years to come. The units here illustrated were submitted by manufacturers in reply to a letter asking for photographs and specifications of machines and products which are new in conception or which incorporate notable improvements over past models.

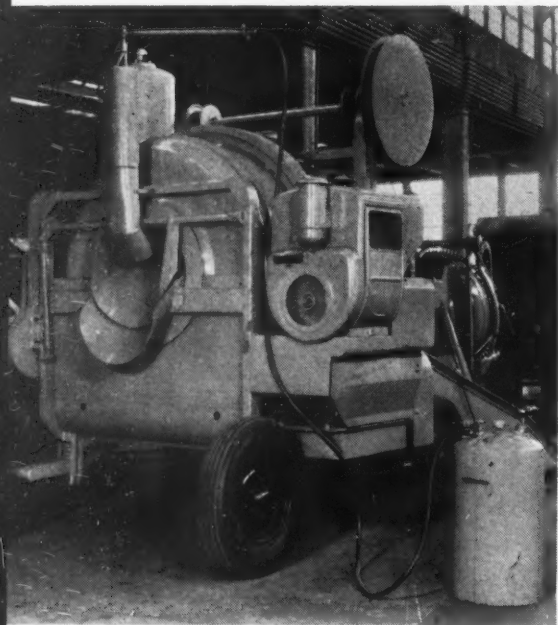
Response to the invitation brought a mass of new items. The editors faced a problem in fitting the material to the space available. It was necessary to adopt

standards to guide the selection of items for illustration. In broad terms, the choice has been governed by the following criteria: (1) The special section is restricted to construction machines and their attachments, and products of non-mechanical or structural character are reserved for use elsewhere; (2) items previously announced are not repeated, and (3) pictures of new units from any one manufacturer are unavoidably limited in number, in order to apportion space equitably among all contributors.

No predetermined grouping or sequence of products has been attempted. Each illustration is used where it best fits the layout. Constant variety marks the display from beginning to end. For a construction man, it contains no dull spots.



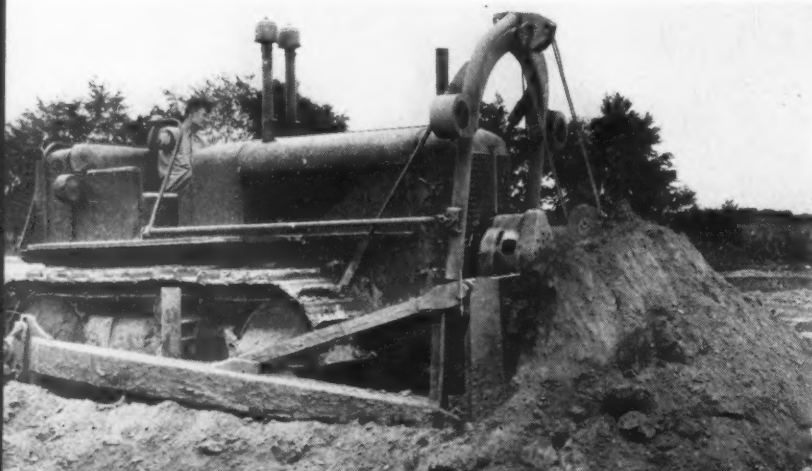
NEW HIGH-ARCH FRONT AXLE of Adams Motor Grader No. 512 has distinct operating advantage in straddling of large windrows of dirt or oil mix material. Full-floating, two-piece rear axle—in which axle carries no weight of grader, but serves only to drive machine—reduces possibility of breakage.



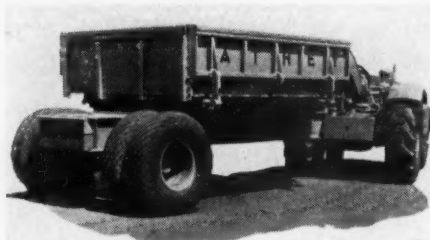
QUICKLY ATTACHED TO NON-TILTING DRUM MIXERS, oil burning heater (above, left) manufactured by Aeroil Products Co. conforms to general appearance and workmanship of original equipment. Flame distributor guides 2,000-deg. F. flame into mixer drum. Shipping weight of 100 to 200 lb. includes brackets for attaching heater to mixer, oil resisting rubber hose and welded steel fuel tank. Other Aeroil heaters are available for tilting drum mixers and mixers with power loaders.

Page 98

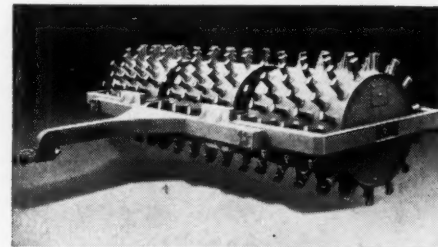
NOW IN FULL PRODUCTION Allis-Chalmers HD 14C Torque Converter driven tractor (below) balances tractor speed with load being moved to give maximum operating speed at all times. Torque converter is simplified drive having only two moving parts separated by cushion of oil which eliminates solid contact between engine and power train and prevents shock and abuse to tractor parts and auxiliary equipment. Power for 30,000-lb. tractor is furnished by General Motors two-cycle, six-cylinder full-diesel engine with developed horsepower of 132.19 at drawbar and 150.48 at belt.



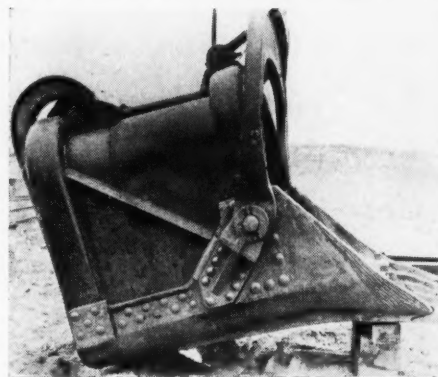
NEW RUBBER-TIRED UNIT, PD-10 Trailer (below) announced by Athey Products Corporation, is designed for use with Caterpillar DW-10 Tractor for high-speed hauling on earthmoving projects. Hydraulically controlled, 15,000-lb. unit, mounted on 14:00x20, 16-ply tires, has heaped capacity of 10 cu.yd., struck capacity of 8 cu.yd. and discharges its load from either side. PD-10 Trailer without tractor is 21 ft. long, 9 ft. 4 in. wide, 7 ft. 2 in. high at rear, 7 ft. 10 in. high at front and has maximum load capacity of 15 tons.



SCIENTIFICALLY DESIGNED to insure efficient compaction of loose fill, Hell Sheepfoot Tamping Rollers (below) are used extensively on construction projects where rapid preparation of subsoil is desired. Available in three sizes, single, double and triple drums, each roller consists of heavy-duty steel box frame to which roller drums are attached by means of dust-proof bearings.



LIGHTER WEIGHT is principal advantage of General Purpose Cast Welded Dipper (right) offered in size range from 3/8- to 5-yd. capacities (larger sizes on special order) announced by Electric Steel Foundry. New design augments well-known regular line of ESCO manganese dippers and dragline buckets.



REMARKABLY FAST OPERATING CYCLE is feature of new 1 1/2-yd. Model 38-B fully convertible excavator (below) announced by Bucyrus-Erie Co. Constructed for equal effectiveness as shovel, dragline, crane or clamshell, the new 38-B offers many operating refinements.





LOW OVERALL HEIGHT, wide wheel tread and low center of gravity feature Rex 6S (above, left), first of Chain Belt Company's new line of streamlined concrete mixers to be in actual production. Redesigned to meet new A.G.C. standards, Rex 11S (right) is available in two- or four-wheel mount, end-discharge type, and Rex 16S is available mounted on four-wheel chassis, side- or end-discharge types. Improvements include relocating of lubrication fittings for convenience in greasing, choice of air- and water-cooled motors, redesigned water system and new slip stream shimmy skip.

POWERFUL, HIGH-SPEED, electrically-driven, flexible-shaft concrete vibrator, Model FS-7A, developed by Electric Tapper & Equipment Co., has vibrating speeds of 7,500 to 10,000 rpm. depending on shaft length and consistency of concrete. This vibrator, powered by 1 1/4-hp. motor, can be furnished with flexible shaft lengths of 2, 3, 7, 14, 21 and 28 ft. Vibratory heads are available in four sizes. New, easily manipulated, one-man vibratory screed with powerful standard "SO" three-phase, 60-cycle, 110-v. motor of rugged squirrel cage, induction type is also available.



FAST HEATING, EASY OPERATION and accurate application of materials contribute to economical operation of Spray Master rear-engine-mounted Model CLRC distributor with Vacuum-Flow Full Circulating Spray Bar. Spray Master has one valve for all operations. By turning hand-wheel marked "fill," "spray," "circulate," and "transfer," desired action is obtained. Viking pump with capacity of 355 gal. at 375 rpm. is designed to handle tar, asphalt, road oils, emulsions or cut-back. Capacities of 800 to 3,000 gal. are available.

Page 99

HYDRAULICALLY CONTROLLED Jaques Earth Boring Machine (right) is capable of digging to 9-ft. depth using bit sizes up to 24-in. dia. Self-contained unit, easily attached to truck, weighs 3,400 lb. is 10 ft. long, 4 ft. 3 in. wide and 5 ft. 9 in. high, in traveling position. Power is furnished by International U-4 gasoline motor.

POWER IS SUPPLIED by gasoline engine mounted directly on Fruehauf Transit-Mix Semi-Trailer (below), used with standard tractor equipped with fifth wheel. Weight of trailer is 4,000 lb., capacity is 28,000 lb.

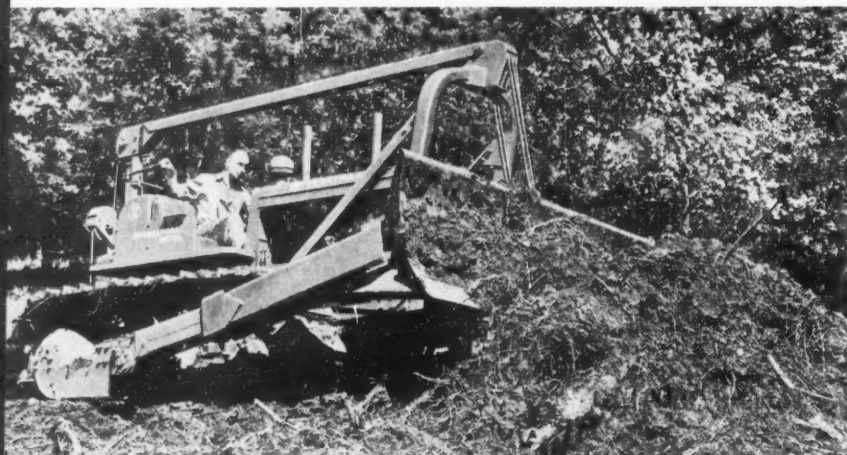




SPEEDY THREE-WHEEL unit of $\frac{3}{4}$ -yd. capacity, Scoopmobile—product of Mixermobile Manufacturers—is used for loading and handling gravel, sand, crushed rock, dirt, coal, snow and other loose materials. Machine is of all-steel construction, is powered by eight-cylinder Ford motor and has four-speed transmission. Hoist winch is of cable type controlled with ball-bearing-mounted disk clutch and spring-loaded brake which automatically holds scoop load at any position until hoist clutch is released. Scoopmobile is usually equipped with dual front wheels.



HIGH PRESSURE LUBRICATION for construction equipment, cars or trucks is supplied by small portable service station announced by Alemitite Division of Stewart-Warner Corporation. Unit also inflates tires and, with spray gun accessory, is capable of applying rust preventive or other surfacing material to equipment. Entire unit weighs 246 lb. and measures $29\frac{1}{2} \times 31\frac{1}{8}$ in.

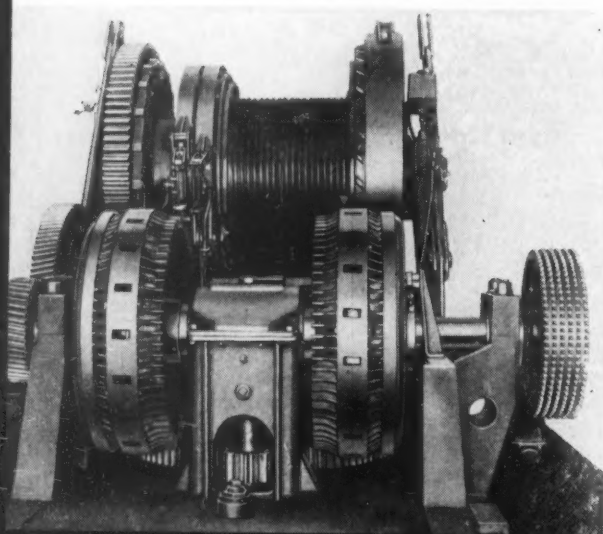


CABLE ON ENGINE-FRAME-MOUNTED Trailbuilders and Bulldozers designed for use with International TracTracTor provide direct overhead lift. Over-all weight of new style dozer is appreciably reduced without sacrificing sturdiness. Shown here is Heil Model CE-18TW Trailbuilder on International TD18 Tractor.

Page 100

DESIGNED TO ELIMINATE greatest single source of wear in drag-line operation Magnetorque electric clutch (below, left), manufactured by Harnischfeger Corporation, is already in use on number of new P&H 3-yd. excavators (below, right). New clutch transmits

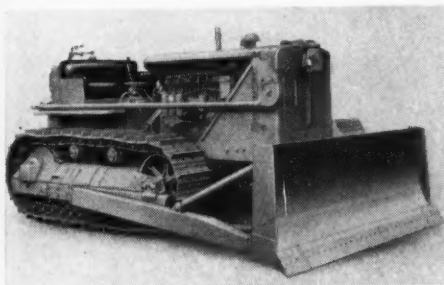
power for swing and propel motions by means of electromagnetic forces, doing away with all frictional connections between mechanism itself and engine that drives it, thus solving greatest engineering problem in design of large friction shovels.





TRAVEL TIME BETWEEN JOBS is cut by mobility of Michigan T6-K truck-type 3/4-yd. shovel which is convertible in 2 hr. or less to 6-ton crane, clamshell, dragline or trench hoe. Operator fatigue is reduced to minimum and peak operating speeds are maintained by Michigan fingertip air controls.

CABLE-CONTROLLED BULLDOZERS (below) and scrapers announced by Caterpillar Tractor Co. more than a year ago are now in production as result of lifting WPB restrictions. Among outstanding advantages of Caterpillar bulldozers are: balanced design, great capacity, rigid construction, elimination of A-frame, reinforced blade, easy digging, inclosed operating cables, long-life cutting edges, easy blade adjustments, quick mounting, correctly-grooved



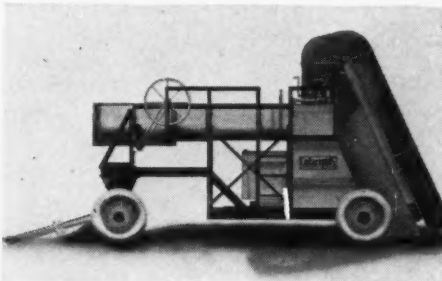
sheaves, long cable life, safe operation, fine visibility, high lift, low drop, straight or angling cut, unit manufacture and one service source.

FINE METAL WIRE CORD (below) with high tensile strength is firmly bonded with rubber to provide foundation for new tire announced by Firestone Tire & Rubber Co. Because of strength of metal, fewer plies are required and walls of tire consequently are thinner. Metal dissipates heat from hot spots giving cool-running tire with about 25 percent more tread mileage.

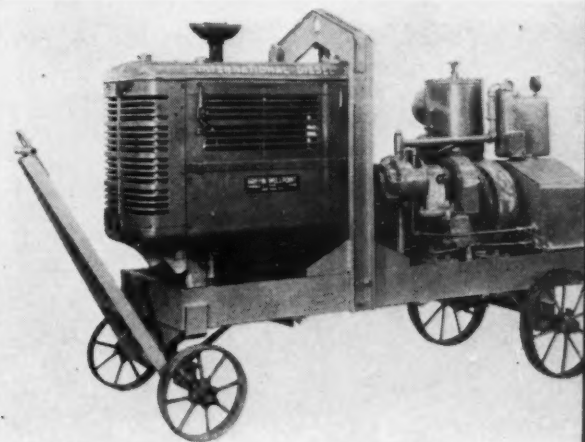


NEW TRAVEL PLANT manufactured by Hetherington & Berner Inc. is completely self-contained, continuous-mix machine approximately 8 ft. wide and 22 ft. long, mounted on six pneumatic tires and driven by two gasoline engines. Capacity of plant is 100 to 120 tons per hour of any low-cost or medium-type bituminous mix. Paving speed can be regulated as desired between 4 to 50 ft. per min. Machine will travel on highway, under its own power, at 15 to 18 mph., eliminating necessity for hauling on trailer between jobs.

SMALL, PORTABLE CONTINUOUS MIX (below) Cedarapids Patchmaster Asphalt Plant is designed for use by municipalities, counties and on small contract jobs. Machine has 25-ft. overall length with feeder (20-ft. 6-in. without), 6-ft. 10-in. overall width, 12-ft. 1-in. height and total weight of 11,250 lb.



with gasoline power and feeder, but without wheel equipment. Standard power unit is gasoline engine, LeRoi Model D226 P8 with clutch and reduction gear takeoff.

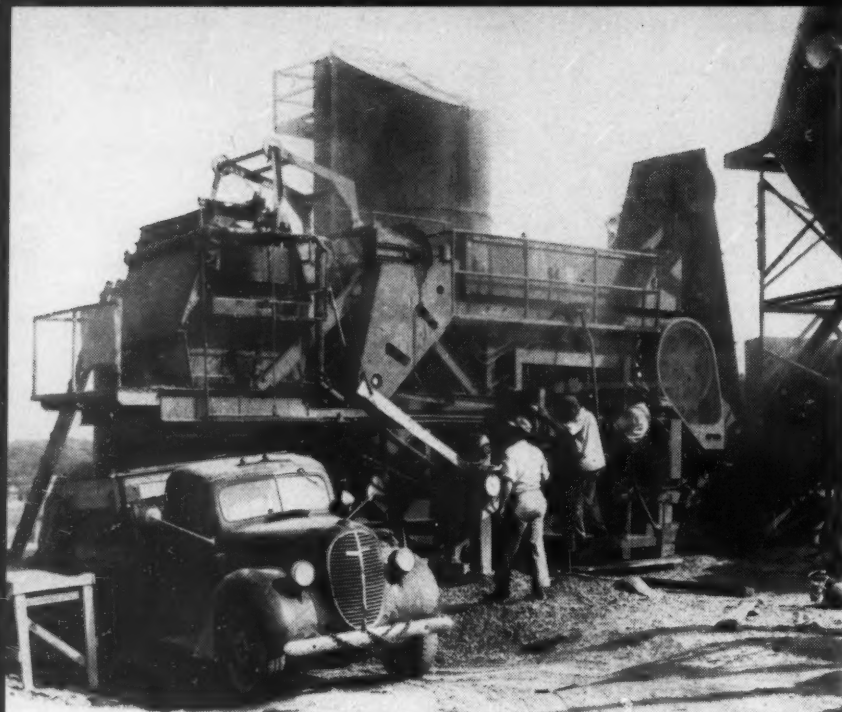


POWERED BY INTERNATIONAL UD-9 engine, Griffin Model 108-D, 10x8, Vac-U-Matic Wellpoint Pump delivers 2,800 gpm.—300 gpm. greater than its former rating powered with gasoline engine. Among other mechanical improvements incorporated in this model is elimination of all packing in stuffing box.

Page 101

COMBINATION DRAGLINE, CLAMSHELL AND CRANE, Hystaway unit mounted on rear of tractor does not impede limited use of bulldozer. When full bulldozer production is desired, or tractor is needed for other conventional uses, unit can be removed in less than 1 hr.; unit can be reinstalled in 2 hr. Easily transported by dump trucks or flat-bed trucks, Hyster Hystaway can be moved from one job to another for tractor installation.

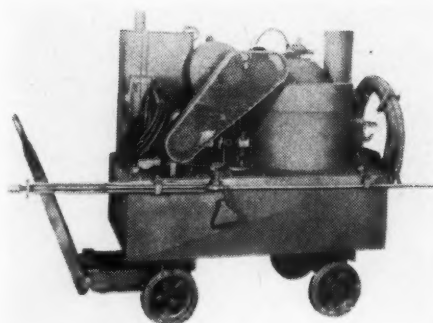




PORTABLE BATCH-TYPE ASPHALT PLANT, Model F, announced by Iowa Manufacturing Co., has pugmill capacity of 2,000 lb. Total weight of plant is 45,000 lb., length traveling, 32 ft. 8 in. (set up, 36 ft. 7 in.); width traveling, 8 ft. 6 in. (set up, 10 ft. 9 in.); and height traveling, 13 ft. 5 in. (set up 18 ft. 6 in.). Power unit is 60- to 65-hp., gasoline or diesel engine. Plant moves on six dual wheels equipped with 8:25x20 tires.



NEW, RUGGED, AND MODERNIZED, ten- and twelve-ton, three-wheel rollers manufactured exclusively for the U. S. Navy during the war are now available to the construction industry. Months of heavy service with Navy units established the rollers as soundly engineered, precisely manufactured and capable of producing excellent results on all types of construction. A new four-speed transmission, which provides a wide selection of speeds without the use of inefficient throttle control, is one of the several new features offered. Other advantages: inclosed front-end, top-air intake for a cleaner engine compartment, and a more efficient cooling system; readily accessible clutches; heavy, reinforced, all-welded steel channel frame; low-pressure hydraulic steering for effortless and instantaneous operator control; roomy operator's station with all controls within easy reach of the operator; heavy-duty bearings throughout; simplified differential lock; all rolls cast from special analysis alloy iron which provides long wear without glazing; and a heavy-duty six-cylinder gasoline or diesel engine selected specifically for road roller service—Buffalo-Springfield Roller Co., Springfield, Ohio.



HOT VAPORIZED CLEANING solutions are delivered under selective pressures up to 200 lb. by Oakite-Vapor Cleaning Unit, self-contained, down-draft flame, oil-fired, inclosed coil-type steam generator. Wide range of fuel oils, kerosene or gasoline may be used to operate unit which is used on many different types of light and heavy-duty cleaning. Rugged construction insures long, continuous, trouble-free service. New exclusive features provide for simplicity and ease of operation and maintenance.

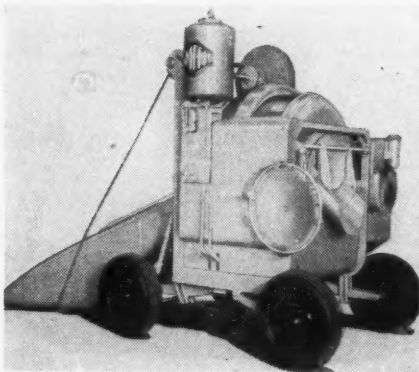
← **OPERATING ON ENTIRELY NEW PRINCIPLE,** portable Balcrank Minit High-Pressure Lubricator brings life-giving grease to construction equipment on the job. Among many exclusive features of Minit Lubricator is Padl-Pak Tamping Blade, which eliminates air pockets without use of bleeder valves. Device paddles and packs grease as it pumps, assuring 100 percent delivery of uncontaminated lubricant into fitting under all field conditions. Jiffy Change Adapter, with universal swivel as integral part of hose line, permits quick adapter change for button-head, hydraulic or pin-type fittings.

STRONG ROTATION, LOW AIR CONSUMPTION and exceptional drilling speed give low-cost-per-foot hole drilling with Worthington Blue Brute wagon drill Model UMW-40 (below). Newly designed drill uses heavy-duty drifter with 4-in. cylinder diameter. It has rifle bar rotation and Worthington positive acting end-seating valve with circumferential seal. Cylinder-controlled blowing device gives exceptional hole cleaning ability. Controls of positive feed mechanism are within easy reach of operator. Standard roller chain is guided over large size gear and idler sprockets. Power is supplied by six-vane rotary air motor.



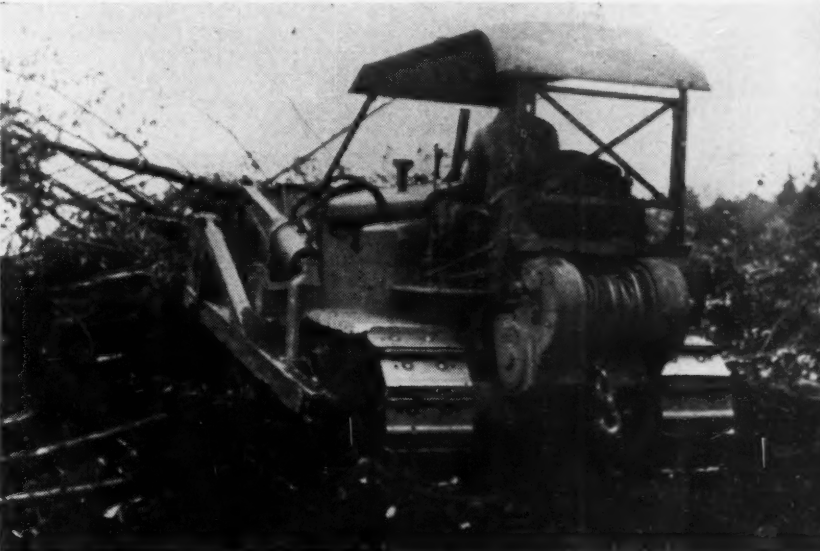


OPEN-TYPE IMPELLER with large clearances in Model 24S3 Homelite Self-Priming Centrifugal Pump (left) permits passage of mud and sand without costly stoppages for cleaning. Weighing only 95 lb. pump is easily set up by one man. Pump is powered by Homelite air-cooled, two-cycle gasoline engine, has 3-in. suction, 3-in. discharge, 28-ft. lift, and up to 15,000-g.p.h. capacity. Model 19S2 (right) with capacity of 10,000 gph. and weight of 88 lb., and Model 22S1½ with 3,000 gph. capacity and 48-lb. weight are also available.



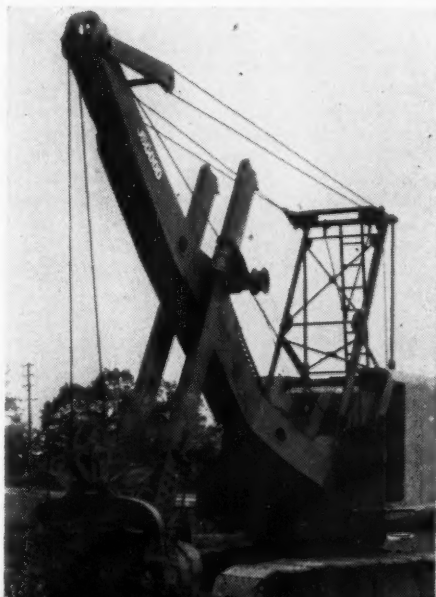
FASTER CHARGING, MIXING AND DISCHARGING new ½-yd. streamlined model 16-S mixer, product of T. L. Smith & Co., has many advance features. Some of these are arc-welded unit box-girder frame; individual wheel springing (knee action); gasoline engine or electric motor direct-connected to unit transmission, incorporating skip hoist thereby insuring permanent

alignment of all parts; reduction gears running in oil-tight case; self-priming, centrifugal water pump direct-connected to transmission case (optional equipment); open-end, streamlined skip; skip vibrator with open parts inclosed in oil-tight case; siphon-type water measuring tank; spring stabilizers for charging and mixing cycles; big-diameter, narrow drum; anti-friction bearing equipped drum rollers; famous end-to-center mixing action; and sturdy, lightweight construction.



EXTRA WIDE WITH LOW CENTER OF GRAVITY, Oliver Cletrac DGH-gasoline-powered hillside model crawler tractor is virtually non-tippable. Wide spacing of tracks and controlled differential steering in which both tracks are engaged at all times aids maneuverability. Stopping, starting and backing up, necessary with crawlers that have to push in straight line to get full power, is eliminated. Constant two-track traction enables "Cletrac" to function effectively on soft terrain and make it ideal for land clearing operations.

CHAIN CROWD SHOVEL (below), Osgood 1000, with 2½-yd. dipper, 25-ft. 6-in. boom and 18-ft. handle has 25-ft. 3-in. maximum dumping height, 32-ft. dumping radius, 35-ft. 4-in. digging height, 35-ft. 9-in. digging radius, 23-ft. 6-in. radius cut at floor level, and 7-ft. 2-in. depth of cut below floor level. Convertible to dragline, clamshell or crane, Model 1000 is diesel-, gasoline-, oil- or electric-powered.



AVAILABLE IN LENGTHS from 6 to 26 ft., Master vibratory concrete finishing screeds (below) provide accurate strike-off and compaction of concrete in one easy operation. Screeds are powered by 1½- or 3-hp. gasoline engines, or 1½-hp. electric motor. Area of 6,000 sq. ft. per hr. is finished by 20-ft. screed. Standard screeds produce flat surface, but screeds for producing crowns and parabolic curves can be furnished.





FOUR NEW HEAVY-DUTY MACHINES incorporating outstanding features developed from wartime engineering experience, and designated as Thew Lorain "41" Series consists of a chain-drive crawler machine (left) and three rubber-tired machines one with four-wheel drive (right), one with six-wheel drive and a third of the self-propelled type. The two-speed crawler machine features an entirely new mounting that is longer, wider and heavier. Standard treads are 30 in. wide and travel speeds in either direction are $\frac{3}{4}$ and $1\frac{1}{2}$ mph. Steering is done from the cab in any swing position of boom. The tread and travel lock is also a new development, being of the positive, four-way ratchet-and-pawl type. The unit, which is convertible to shovel, crane, dragline, clamshell or backdigger, has increased crane, clamshell and dragline capacities. The four-wheel drive Moto-Crane is of 20-ton capacity with a specially designed six-wheel carrier for shovel and crane loads. With ten

speeds forward and two reverse, this new rubber-tired machine has a speed range of from 1 to 28 mph. Travel power is supplied through two worm-driven axles to four dual-tire rear wheels which are equipped with air brakes. This unit is also convertible to shovel, crane, dragline, clamshell or backdigger. The six-wheel drive Moto-Crane offers commercially for the first time a heavy-duty, 20-ton-capacity crane developed for and used in military service. This crane has double reduction drive on all axles, eight speeds forward and two reverse, and will travel from 1 to 31 mph. Steering is air power-assisted and air brakes are on all six wheels. The self-propelled crane is of the single-engine, single-operator type and power is supplied on four worm-driven rear wheels. Self-propelled crane is of the single-engine, single-operator type. Power is supplied on four worm-driven rear wheels.

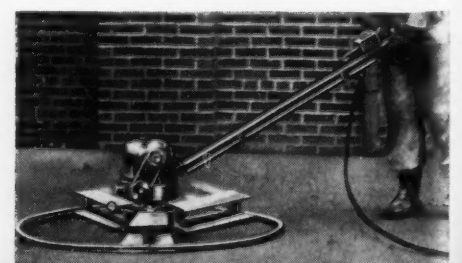
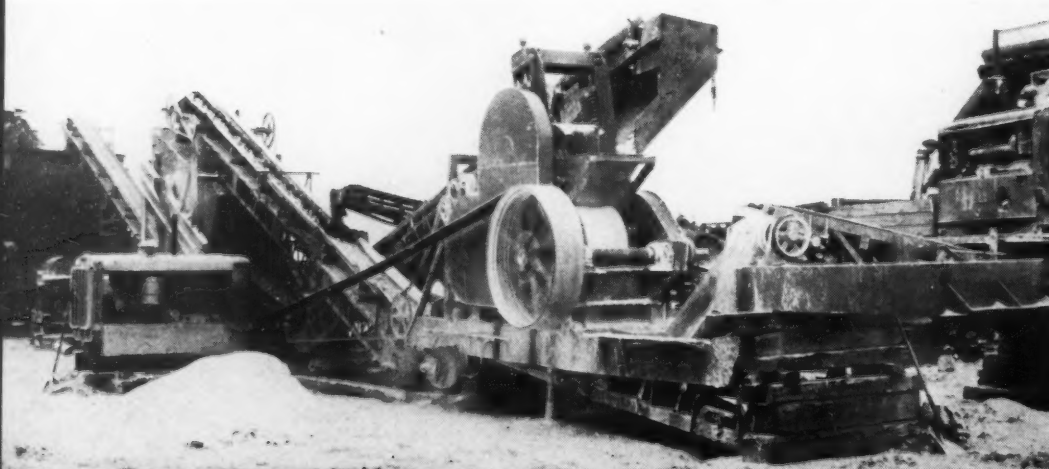


AUXILIARY PUMPING AND SPRAY BAR equipment for Seaman Mixers fill need for closer control of water increment in road mixing for several soil stabilization processes, closer control of bitumen to obtain better coverage, and closer control of water increment in earth compaction for fills, levees and similar earthworks. Spray bar as wide as mixing rotor is attached to Seaman Mixer, at rear cross-member of frame which supports hydraulic ram. Spray is directed to intersect spillover of material at front of hood about 3 or 4 in. above ground; balance of spray meets ground just ahead of spillover allowing water or oil to be mixed with material.

Page 104

ROCK IS CRUSHED between rolls one and two and again between two and three in new Pioneer Triple Roll Crusher (below) manufactured by Pioneer Engineering Works, Inc. Installation shown here is that of Roverud Brothers, Spring Cove, Minn.

FLOATING AND FINISHING OF CONCRETE by same machine is feature of Master Turn-A-Trowel (below). Instant change of trowels is provided by direct indexing adjusting knob which accurately sets all trowels to same pitch. Turn-A-Trowels are manufactured in two sizes, 34-in. dia., powered by $1\frac{1}{2}$ -hp. gasoline engine, or $\frac{3}{4}$ -hp. electric motor; and 48-in. dia., powered by 3-hp. gasoline engine or $\frac{3}{4}$ -hp. electric motor. Engine and electric motors are interchangeable on each model.





WIDENING FINISHER DEVELOPED by Blaw-Knox Co., intended primarily for widening work on concrete paving construction, can be used also for building concrete sidewalks in widths of 2 to 6 ft. Inexpensive to operate, finisher has two traction speeds, forward and reverse, and has two screed speeds which allow for concrete of different textures. Blaw-Knox Co. also announces precision sub-grader, segregation eliminator, and concrete paving conveyor.



AUXILIARY ENGINE mounted back of cab of Truckstell-Clark Booster truck is cut in by driver to furnish 50 percent additional power when needed.



DYNAMICALLY BALANCED CRANKSHAFT and precision parts feature W-Type Jaeger Air Plus Portable Compressor which operates at unusually slow piston speed of 800 ft. per min. with notable absence of vibration. Fuel tank is mounted inside main frame permitting use of large air receiver. Force feed, electric starter, grouped controls, large tool boxes, Timken bearing wheels, and "autosteer" axle on all four-wheel trailers are standard. Truck-mounted, skid-mounted, and tractor-mounted and powered units are also offered.



POWERED BY 275-HP. DIESEL ENGINE, new Model 3TD Rear Dump Euclid weighs 38,000 lb., has payload capacity of 44,000 lb., is equipped with 14:00x24 front tires and 18:00x24 rear duals and has top speed, loaded, of 31.2 mph. It is newest addition to Euclid line of off-the-highway hauling equipment and is designed for use with large loading equipment. Hydraulic steering is standard equipment.

Page 105

JEEP SERVES AS DUAL-PURPOSE construction machine (below, left), with blade for backfilling ditches and Milwaukee Truck Crane Co. Model H-2-C all-hydraulic crane for varied construction uses. Crane has 2-ton lifting capacity, same as Chevrolet-mounted unit (below, right), has no gears, drums or clutches and is operated by power from engine of truck transmitted through Spicer power takeoff. Telescopic boom is extensible and retractable under load, from 14 to 22 ft., is full revolving, has line speed of 75 ft. per min., and hoisting speed of 60 ft. per min. Operator can swing, hoist and work his line all at same time. Attachment for this machine is new all-hydraulic shovel front which carries no rack or pinion gears, but is operated with telescopic boom and hydraulic combination digging and re-handling bucket.



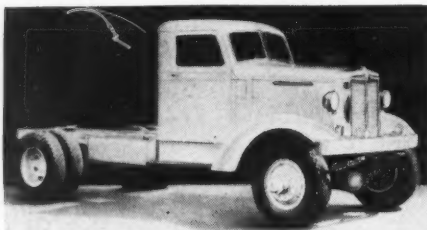


EIGHT YEARS OF ENGINEERING DEVELOPMENT and on-the-job experience are represented by Model W-1400-TR Oshkosh Earth Mover. It combines powerful diesel four-wheel drive, four-wheel power steer tractor with semi-trailer unit designed for quick loading and unloading plus rapid drive. Short turning radius (complete U-turn in 35 ft.) and speed (up to 28 mph.) make Oshkosh Earth Mover efficient hauling unit for working with power shovel.

PNEUMATIC-TIRED COMBINATION CRANE-SHOVEL-DAGLINE, rated $\frac{1}{2}$ yd. as shovel with quickly convertible front-end attachments for complete range of construction, excavation and materials handling jobs, features air booster steering and is capable of highway cruising speeds of more than 20 mph. Fully independent travel, swing and boom at finger touch of lever. Activated by safe, positive metered air control. Features: 4 wheel drive (optional); 4 speeds forward and reverse; easily accessible independent assemblies: self-counterweighting machinery, heavy-duty engine, transmission and clutches.—The General Excavator Co., Marion, Ohio.



HYDRAULIC CONTROL RAISES AND LOWERS pneumatic-tired trailing wheels on Littleford Bros., Inc. motorized portable Model No. 155 Trail-O-Roller designed for construction and maintenance jobs on airport runways, roads, highways and streets. With roller bearing steering control little effort is required to turn front roller in stationary or operating position. For rolling close to wall or curb, wheel is removed in about 1 min. Trail-O-Roller gives 145 to 150 lb. compaction per in. of roller width on rear roller and 40 to 45 lb. on front roller. Weight of complete unit is 4,300 lb.



FIRST MODEL OF NEW SERIES of heavy duty four- and six-wheel-drive trucks especially adapted to cross country and on-and-off highway operation, Marmon-Herrington MH 555-4 has high tractive ability, effective power and maneuverability. Model shown here has 161-in. wheelbase, 131-hp., six-cylinder motor, ten forward and four reverse speeds. Permissible gross loaded weight is 27,000 lb.

Page 106

ENGINE AND ALL MACHINERY of newly designed 40- to 50-ton capacity diesel locomotive crane (below) of Industrial Brownhoist Corporation are carried on one-piece steel rotating bed which supports every shaft and bearing, reduces vibration and assures entire mechanism being kept in alignment for life of crane. Power plant is four-cycle, eight-cylinder, D 17,000 Caterpillar diesel engine.

WATER BUFFALO (below), diesel as well as gasoline driven, will be available as soon as engineers narrow down peacetime requirements of sizes, weights and carrying

capacities to standard models. Food Machinery Corporation, manufacturers of Water Buffalo, produced more than 10,000 amphibious tanks for Navy during war.



8½-YD CABLE SCRAPER, 11-cu. yd. heaped capacity, features floating apron which opens 30 in. before rear gate moves, permitting adjustment to any position before loading. Apron clears load completely as rear gate starts to move forward, thus preventing any compaction of load between gate and apron. Open-top bowl, free of overhead obstruction, permits loading by shovel, dragline or elevating grader, and high lift

of apron enables scraper to discharge any type of material from bowl. Dumping is made easier and uses much less tractor horsepower because of new arrangement of sheave mechanism and design of linkage. Bowl can be raised and lowered quickly due to cam action on bowl lift cable—advantageous when loading sand, gravel or loose material.—LaPlante Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

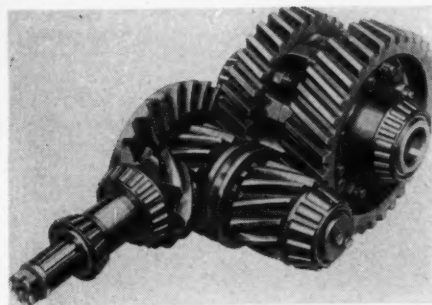




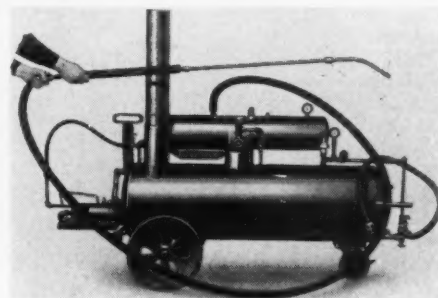
TWIN SILO BULK CEMENT PLANT, recently developed unit in C. S. Johnson Co. line, combines advantages of large storage capacity and flexibility with ease and convenience in dismantling, transporting and erecting when moving to new sites. Complete unit, consisting of all-welded ground level storage silo on hinged legs fitted with Model 14 cement weigh batcher of 1,000-lb. capacity, track screw, inclosed vertical cement bucket elevator with two-way discharge gate and spouts to both silos, forms large capacity plant requiring minimum of ground area and provides 8-ft. 6-in. clearance under cement weigh batcher for truck charging. Unit is available in capacities ranging from 761 to 1,610 bbl. of bulk cement.—C. S. Johnson Co., Champaign, Ill.



ENGINEERED TO MEET high-speed, low-cost earthmoving requirements, Wooldridge Terra-Cobra self-propelled, heavy-duty scraper combines power and speed with positive steering control. Powered by heavy-duty diesel engine with reverse gear and four forward speeds Terra-Cobra attains up to 20 mph. travel speeds on short or long hauls. Massive articulated dual operating king pin couples powerful Terra Cobra tractor unit to heavy-duty scraper permitting flexibility of travel over sandy, soft, rough, rocky or uneven surfaces.



DESIGNED TO GIVE MAXIMUM PULLING POWER and speed in same heavy-duty truck, S-300 and U-300 two-speed rear axles are announced by The Timken-Detroit Axle Co. With ample torque capacity for modern high-power engines, S-300 rear axle is designed for heavy-duty hauling on highways and city streets. U-300 rear axle is for off-highway operations using same engine torque, but where still greater load-carrying capacity is required.



GREASE, GRIT AND GRIME are removed from equipment of all kinds by Siebring Steam Cleaner, economical, time- and labor-saving, entirely-automatic unit designed to do tough cleaning jobs. Newest in Super Heating Burners provide steam in 10 min., using either oil or gas. Electric units are also available. Specially prepared chemical cleaner used with this machine is rust resisting and prevents forming of scale or rust in generator.

Page 107

INNOVATIONS IN DESIGN increase usefulness and efficiency of engine-driven Model SA 200 Shield-Arc welder (below). New model, manufactured by Lincoln Electric Co., differs from previous models of 200-amp. capacity in following features: (1) Job selector which varies speed of engine for welding duty giving accurate control of open circuit voltage resulting in improved welding control, minimum fuel consumption and engine wear; (2) powered by four-cylinder, Continental engine of 29 hp. at 1,400 rpm.; (3) supplied complete with base and canopy; (4) rubber-cushioned engine mounting for smoother operation. Welder is supplied with either rubber-tired or steel-tired trailer. Unit pictured here is specially mounted on skid frame for transporting in truck.



MOBILE FULL-SWING BOOM CRANE (below), tractor mounted, is ideal for loading, unloading, moving or stacking heavy bulky objects outside range of big overhead cranes or where none is available. Announced by the Hughes-Keenan Co., new Roustabout Crane Model MC-8 handles loads up to 10 tons. Booms of standard lengths from 15 to 30 ft. are furnished. Loads of nearly 2 tons at 30-ft. radius and 10 tons at 9-ft. radius are handled.





AVERAGE DAILY OUTPUT of 225 cu. yd. of ¾-in. road stone from Universal 822-Q rock crushing, screening and loading plant is reported by Gallagher & Nelson, operators of quarry near Polo, Ill. Plant consists of Universal Engineering Corp. No. 546-P primary crushing unit complete with apron feeder, grizzly and bypass, and crushed material conveyor; and No. 800 secondary unit with roll crushers, screen, surge hopper and delivery conveyor.

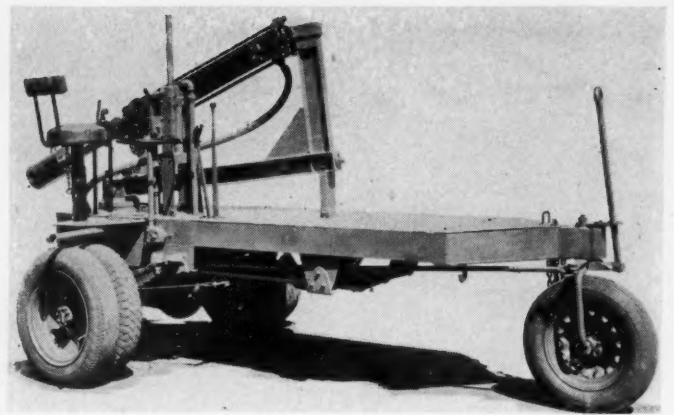
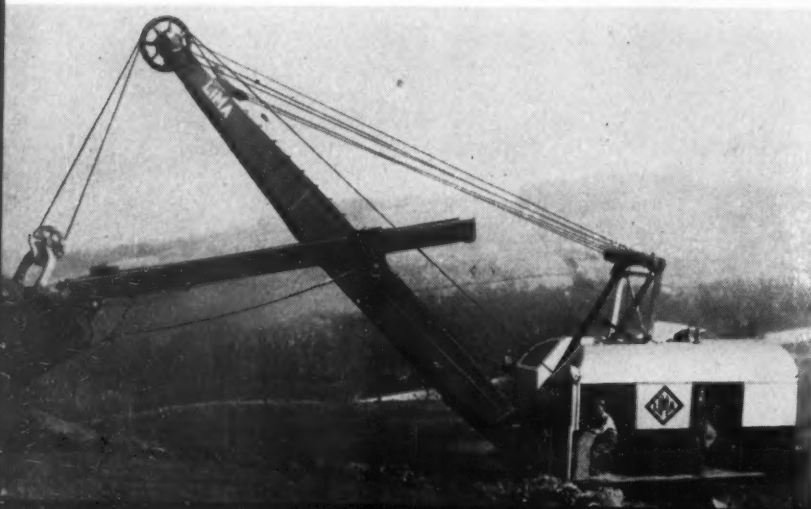
Page 108



3-BAG CONCRETE MIXER (right), end discharge model for small paving jobs and side discharge model for constructing bridges and culverts, has streamlined, rigidly reinforced power skip extra wide for loading from truck and a tilted flow-line chute for faster operation. Selective skip shaker functions only when skip is partially emptied and ready for shaking, thus eliminating choking at skip throat and excessive strain on mixer. Self-cleaning drum blades. Mounted on four wheels, either steel or pneumatic. —Koshing Co., 3026 W. Concordia Ave., Milwaukee 10, Wis.



PRECISION AIR CONTROL is applied to hoist, swing, crowd and propel clutches, and to dipper trip of Lima Locomotive Works Type 1201 shovel, crane and dragline (below). Air control provides ease of operation, simplifies assembly and eliminates many levers, reach rods, bell cranks, etc. Independent clutches make it possible to hoist, swing, travel and raise or lower the boom simultaneously. Extra large-diameter drums give longest possible cable life. Crawler truck, 18 ft. 11 in. long and 12 ft. 7 in. wide, is of end-drive principle with drive chains located back under crawler tread. Choice of diesel, gasoline or electric power is available. Type 1201 when equipped as shovel weighs approximately 212,000 lb., and as crane or dragline, 192,000 lb. Shovel has dipper capacity of either 3 or 3½ yd.



THREE-WHEEL-TYPE PAVEMENT BREAKER for demolishing concrete floors and repairing small patches on highways is equipped with boom that lies back on its axis when towed from one job to other, proving convenient where machine has to pass through door in building that has low head room. When boom is raised, it is held in place by a rear brace running from pin at top of boom and fastened to deck of machine towards front wheel. Any light car can tow machine at 50 mph. It cuts widths ranging from 6 in. to 5 ft. wide and is controlled from operator's seat. Power is supplied by running hose from compressor to supply line of machine. Swing and blow and propelling of machine are pneumatically operated by all controls within easy reach of operator.—The Rapid Pavement Breaker Co., 1517 Santa Fe Ave., Los Angeles, Calif.

MOUNTED ON TWO-WHEEL SPRING TRAILER Schramm compressor-generator unit (below) has actual air delivery of 60 c.f.m. Outfit is completely automatic with pushbutton electric starter, is equipped with 5-kw. generator and has adjustable floodlights.





California Airbase Builds

Runway for 300,000-Lb. Planes

By CLYDE J. GORMAN

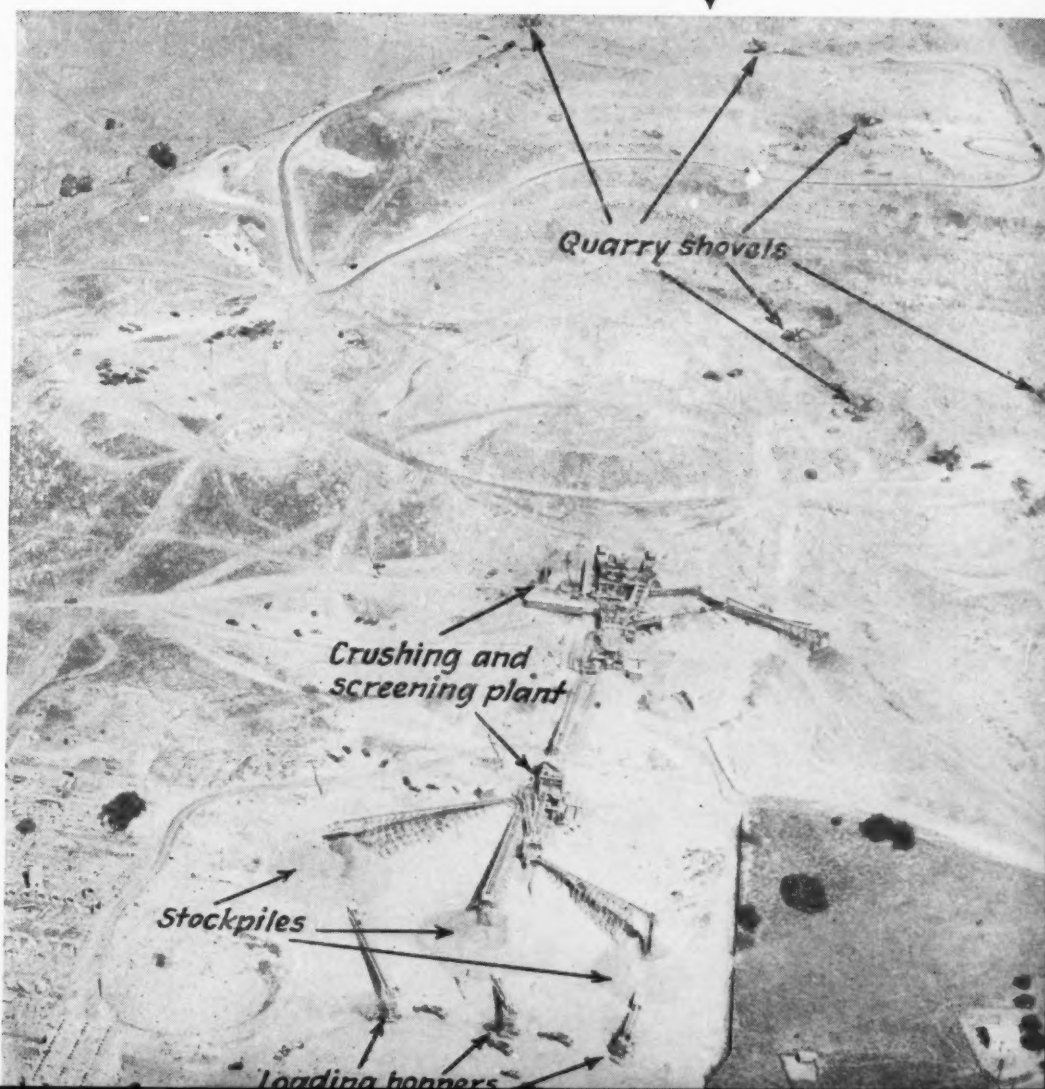
Chief, Technical Information Branch,
U.S. Engineers, Sacramento, Calif.

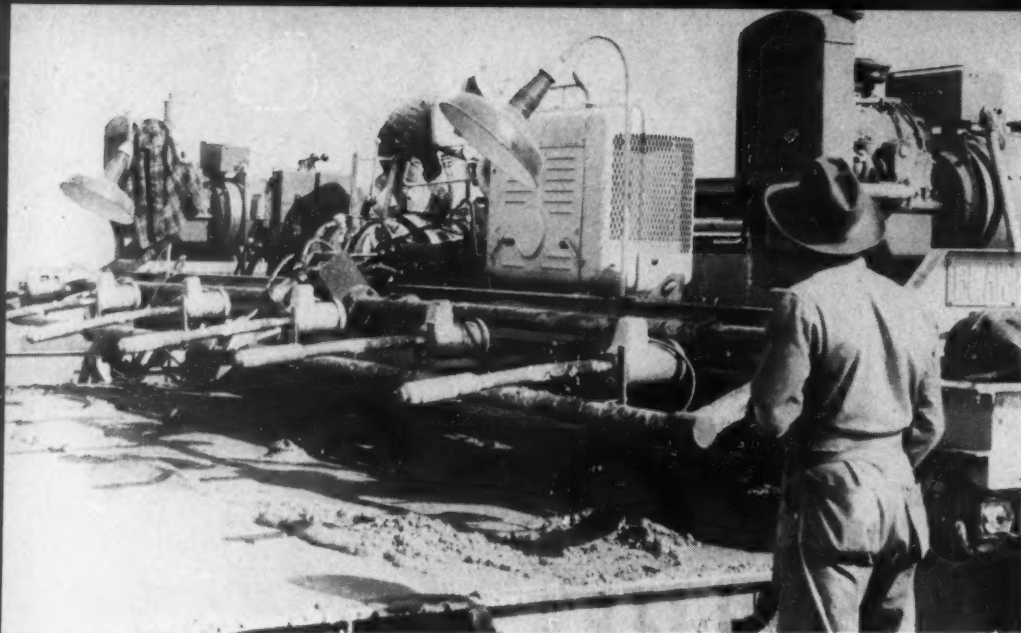
WHEN THE AIRPLANE of tomorrow takes off from today's drawing boards there will be a place for it to land. Tackling the problem of designing runways, taxiways and aprons at the Fairfield Suisun Air Base in California for the 300,000-lb. airplane of the future, with no physical precedent to draw upon, War Department engineers had to extend dope sheets and tables and assign new values to old equations. The result is being transformed into rock, asphalt and concrete by Morrison-Knudsen Co., Inc., and Stolte, Inc., joint contractors.

Begun late in the war, the giant ATC field lost its race with the atom bomb for a final swing on the Nips, but it is so much a part of the days ahead that plans survived war-end cancellations and construction has gone ahead on extensive additions, including a new 8,000-ft. runway paved mainly with asphaltic concrete, and many thousand square yards of aprons and taxiways

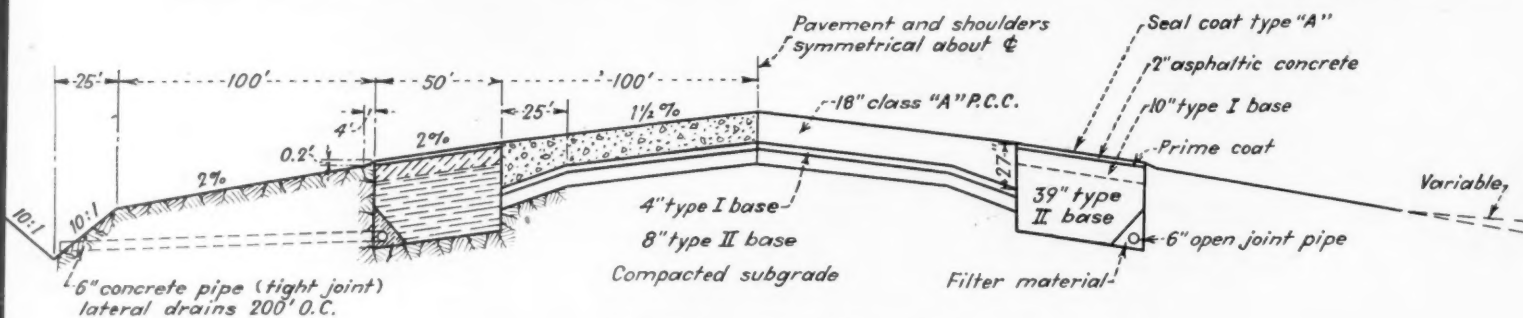
PORTLAND CEMENT CONCRETE PAVEMENT with normal thickness of 18 in. is placed in 25-ft. lane by pair of dual-drum mixers turning out 1.4 cu.yd. batches of dry mixture, about 1-in. slump, deposited on subgrade in front of spreading machine. Note that form in foreground has been increased in height 9 in. to provide 27-in. depth of slab for outer edge of outside lane.

CRUSHED ROCK in huge volume for vast expanse of heavy pavement is produced by processing layout which takes raw material delivered from quarry shovels and passes it through crushing and screening plant to three stockpiles and eventually to three loading hoppers where graded rock is loaded into diesel-powered wagons for hauling about 4 mi. to job. Plant includes eight rock crushers powered by 40 electric motors totaling 2,000 connected horsepower. Designed by George Barlow, concrete superintendent for Morrison-Knudsen, plant has estimated capacity of 750 tons per hr. Largest of three primary crushers is 48x72-in. Birdstone unit.





ON REAR OF SPREADER is mounted battery of six 3-in. Viber vibrators, complete with hinged tubular support and mechanism for raising and lowering. At either side of spreading machine, Kohler gasoline-electric 8-kw. generator is placed on frame to supply power for vibrators as well as for raising and lowering tubular support.



Portland Cement Concrete Pavement

paved with portland cement concrete.

According to H. E. McGee, head of the Sacramento U. S. Engineers' military works division before its post-war consolidation, "The most remarkable feature of the job is the 300,000-lb. gross load capacity of the runway, plus an additional 25 percent capacity for parking aprons

and taxiways, and the layout of runway pattern."

Asphaltic Concrete Runway—To look at these features one at a time the asphaltic concrete runway has a total depth of 64 in. above the compacted subgrade. The first 48 in. is Type II base (crushed rock of 3-in. maximum size). In the 200-ft. center of the strip, this rock

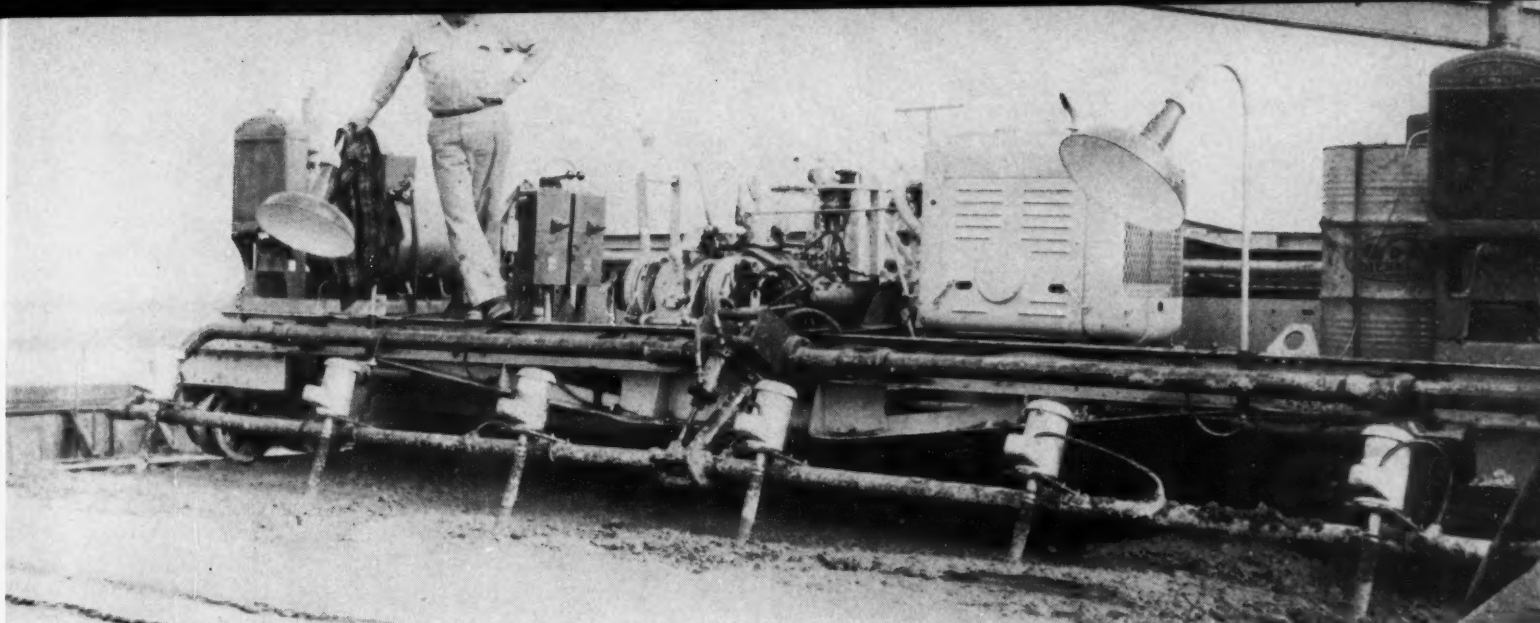
TYPICAL RUNWAY CROSS-SECTIONS of asphaltic concrete and portland cement concrete pavement provide for 150,000-lb. wheel load (300,000-lb. gross load) on asphaltic surfacing and 188,000-lb. wheel load (375,000-lb. gross load) on concrete. Under 18-

is topped by 10 in. of Type I base (graded aggregate up to 1-in. maximum size), next a prime coat, 6 in. of asphaltic concrete, and a seal

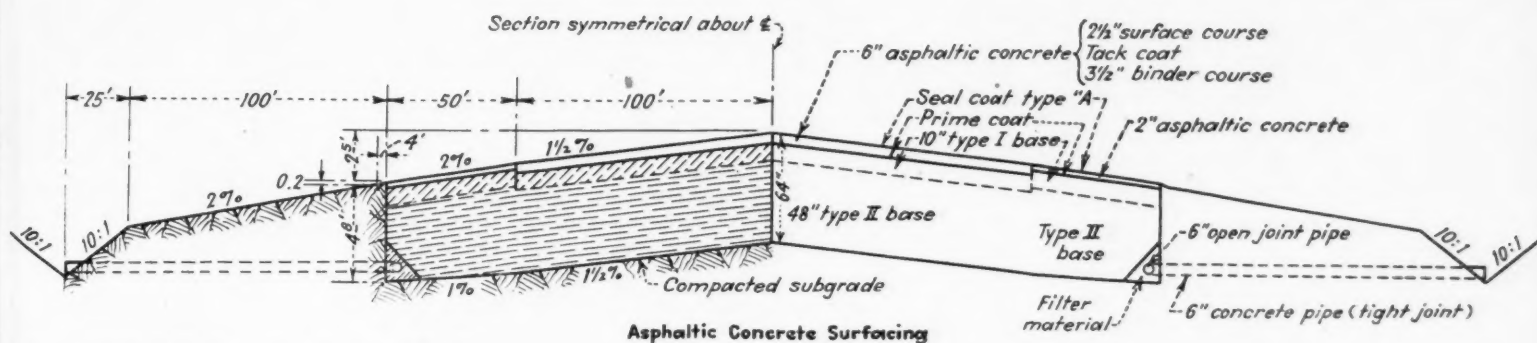
DIFFERENT ARRANGEMENT of internal vibrators (below), mounted on tubular support, vibrates concrete behind spreading machine.

CUTTING DEEP TRENCH (below) required for heavy pavement section. Wooldridge pneumatic-tired Terra-Cobra scraper unit picks up load with aid of two pusher tractors at rear.





EMBEDDED IN CONCRETE, vibrators impart vibrations to concrete internally to produce uniform consolidation of mixture. Hydraulic mechanism is used for raising and lowering support.



in. normal thickness of portland cement concrete, pavement has 12-in. base of crushed rock on top of compacted subgrade. Supporting material under 6-in. asphaltic concrete pavement comprises 58 in. of crushed rock on compacted subgrade.

coat. The asphaltic concrete application calls for a 3 1/2-in. binder course, a tack coat, and a 2 1/2-in. surface course.

Shoulders 50 ft. wide include generally the same base preparation, with adequate but less elaborate surfacing. Additional side clearance is provided by 100-ft. compacted and oiled earth strips. Beginning with a pavement crown

on 1 1/2 percent slope, surface drainage is established by continuation on a 2 percent slope until it finally reaches the parallel 10:1 gutters. An accompanying drawing shows the method of handling subsurface drainage by 6-in. concrete pipes

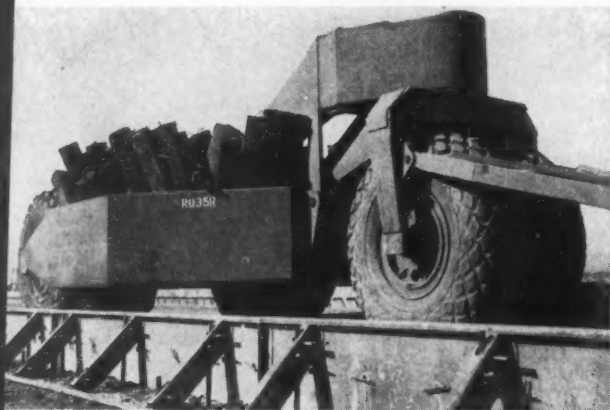
Page 111

IN ROCK QUARRY (below), six 2 1/2-yd. power shovels load blasted rock into dump trucks. Fleet of 25 trucks with capacities from 12 to 25 cu.yd. maintain steady flow of rock from quarry to feeder chute at crushing plant.



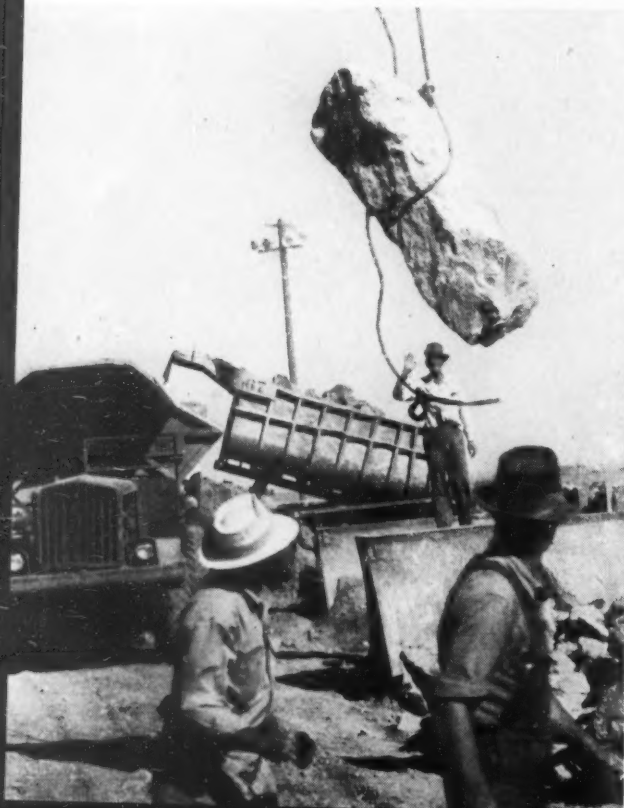


CRUSHED AND GRADED ROCK is hauled by fleet of big Euclid wagons to job site from loading hoppers at crushing plant.



TOTAL WEIGHT of 350,000 lb., attained by loading mammoth pneumatic-tired roller with steel ingots, makes this huge unit on tricycle mounting of three dual wheels particularly effective in detecting subgrade weak spots. Designed by Sacramento U. S. Engineer office and built by Peterson Bros. Contractor & Equipment Co., giant roller, known as "Gismo" on the job, is drawn by wheel tractor. Note temporary dowels attached to steel forms.

LARGE ROCK from quarry is dropped by crane into feeder chute at crusher plant as H. L. LEVENTON, general superintendent of Morrison-Knudsen operations, gives signal.



which tap the crushed rock just above the compacted subgrade.

Portland Cement Concrete Pavement—The portland cement concrete pavement section involves some differences in terms of design. For one thing, a 25 percent increased load factor over the asphaltic concrete runway makes allowance for what a giant airplane can do to a surface when from four to eight engines aggregating thousands of horsepower start warming up or dragging a ship around on the ground. The design also puts increased emphasis on strength to withstand landing impact.

Aprons and taxiways are paved with 18 in. of Class "A" portland cement concrete, thickened at the edges to 27 in. Shoulder construction is identical with the asphaltic sections. Under the portland cement concrete is a 10-in. base of crushed rock above the compacted

subgrade. This rock sandwich is refined as before with Type II and Type I layers.

In a conventional airport, ships have to taxi to one end or the other of a runway before they can take off or get to a hangar. As can be seen, a modern taxiway is expensive to build. Besides, it has been determined in a general way that the same amount of gasoline which will propel an airplane 50 mi. in the air will haul it only a mile on the ground.

To reduce wasteful taxi travel, the new runway at Fairfield-Suisun lines up as a continuation in the same direction as an existing 8,000-ft. runway, from which the new addition is offset 1,000 ft. Although the older runway is not so heavy as the new one, it can handle B-29's easily. Including 1,000-ft. extensions of compacted earth at both ends of the two runways, they provide an overall stretch of 20,000 ft. in the direction of the prevailing wind. In the 1,000-ft. offset distance between the runways are grouped the loading and unloading areas, filling stations, shops and other facilities. Incoming and outgoing airplanes can use the more convenient runway to cut down taxi distance. Thus no ship needs to taxi more than about 1,000 ft.

Accompanying photographs tell part of the story of how Morrison-Knudsen Co., Inc., and Stolte, Inc., are building the project.

CONCRETE DRAINAGE PIPE of 72- and 75-in. dia. is large enough to admit BOB STODARD, utility superintendent. At left is JOHN J. GORMAN, utility foreman.



Ohio Improves Old Pavements by Widening and Resurfacing With Bituminous Concrete

By C. R. HANES

Field Engineer, Bureau of Construction,
State Department of Highways, Columbus, Ohio



CHINESE ENGINEERS study Ohio Department of Highways organization and practices for application to their country. With C. R. HANES (right), author of this article, are ENGINEERS CHEN (left) and LU, of Chinese War Transportation Board.

Page 113

RECENT STUDIES indicate that nearly two-thirds of Ohio's state highway mileage is in need of improvement to bring the system to a standard desired for present-day traffic. The state system now consists of 18,490 mi., with approximately 2,300 mi. inside municipalities. As a result of extensive and successful experience, the Department of Highways is continuing a program of improving much of the deficient mileage by widening and resurfacing existing pavement with bituminous concrete.

Well distributed about the state are 127 municipalities with populations between 2,500 and 10,000; 59 with more than 10,000; 26 with more than 25,000; 12 with more than 50,000; and eight with more than 100,000. To satisfy a demand for hard-surfaced connecting roads to serve the widespread distribution of population centers, many miles of highways were built in the early

IN TWO PARTS...

Part 1



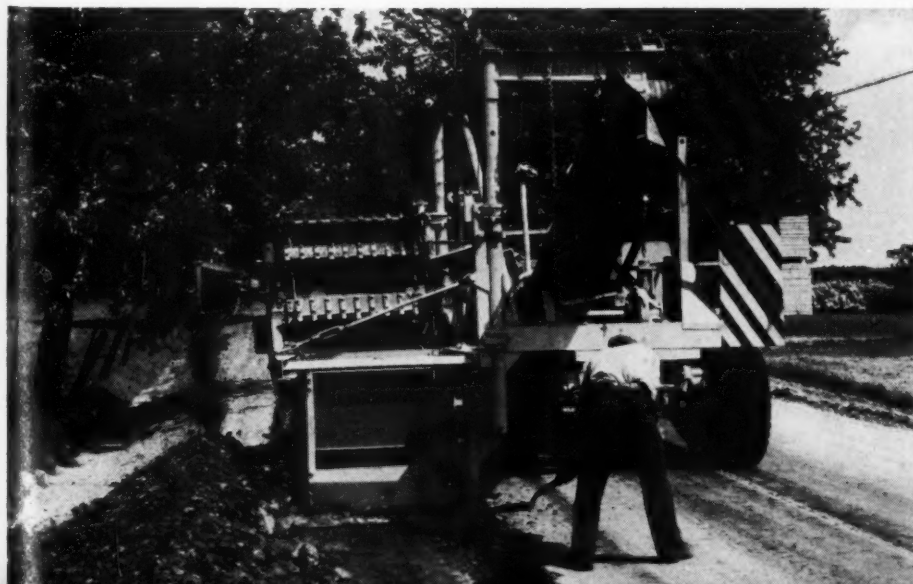
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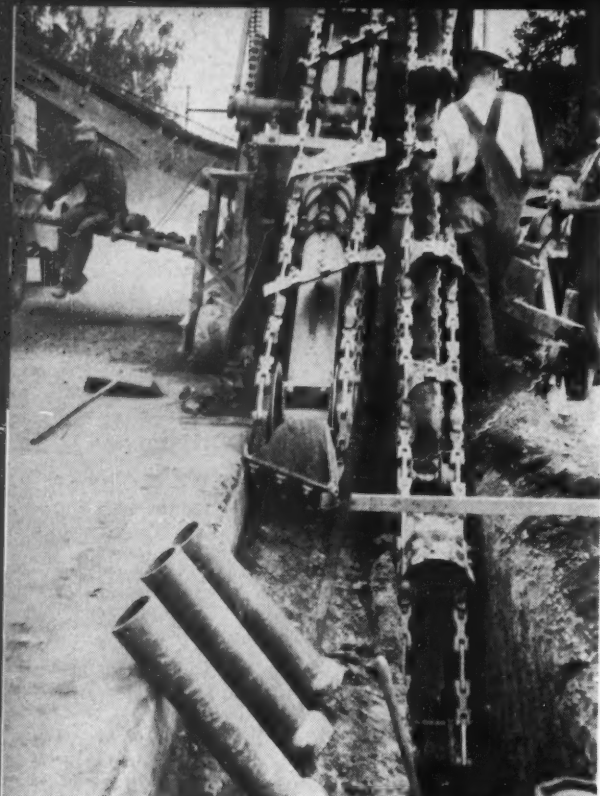
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EXCAVATION FOR WIDENING without side forms (below) is done by Buckeye trencher unit mounted on truck chassis. Grade is controlled from old pavement; on rough pavement, it is desirable to lay preliminary leveling course before excavating.

ROOTER (1) loosens shoulder earth ahead of specially designed plow (2) attached to one end of bulldozer apron for excavation of widening strip. Power grader (3) removes portion of loosened material and at times gives snatching assistance to bulldozer.

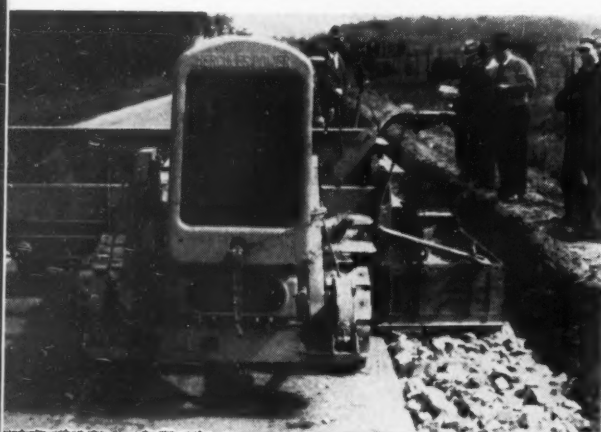


3



POROUS BACKFILLED UNDERDRAINAGE is placed alongside pavement to eliminate sub-surface water. Buckeye trencher equipped with auxiliary boom, developed by A. J. Baltes Co., of Norwalk, Ohio, cuts sloping face from edge of pavement to trench.

Page 114



SPREADING EQUIPMENT, adapted by S. E. Johnson & Co., of Toledo, from Cleveland trench tamper unit, is self-propelled and carries aggregate to end of box with conveyor belt type of arrangement. This method of spreading results in uniform distribution of material with minimum of labor. Aggregate is rolled and filled with screenings to complete insulation course in essentially same manner as for macadam construction, but material is not waterbound.



AGGREGATE IS SPREAD for coarse graded insulation course after excavation has been completed with trencher unit. Forms are not required.

"good roads era" which was born with the development of the automobile. These roads seemed to be the last word in design at the time, but subsequent revisions in highway demands and thinking have relegated many of these roads to the inadequate class.

The "pay as you go" policy followed in Ohio has necessitated spreading the highway revenues over the greatest possible mileage. Ohio's problem differs from that of many other states because of its great population, heavy industry, agriculture and mineral resources which combine to impose heavy traffic demands on the extensive highway system.

Deficiencies on many roads are due primarily to inadequate widths and riding qualities. Other sections are in a state of partial failure as the result of carrying increasingly heavy wartime loads which, with the suspension of overload penalties, have accelerated the demand for improvements. War restrictions either ruled out heavy construction entirely or reduced it to an absolute minimum as far as improving the regular highway systems was con-

cerned. The prime requirement, therefore, was to perform work of such nature that the roads could continue to serve immediate demands without examining the improvements too closely in the light of present-day planning standards for new projects.

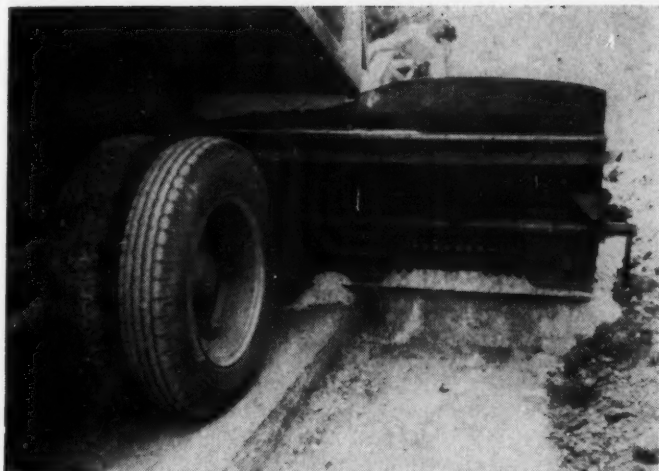
Improving Existing Pavement

A number of years ago the Ohio Department of Highways instituted a program of bringing its inadequate roads to a higher standard by widening and resurfacing. The economy of this practice cannot be questioned, especially since many sections of Ohio have such topography that the lines and grade of the road as originally constructed are not obsolete. The problem thus resolves itself into one of widening and smoothing up, with correction of the occasional failures which have shown up with the passage of time. This brings the pavement up to a standard that will approach modern traffic demands and either meet those requirements indefinitely or carry it over until more ex-

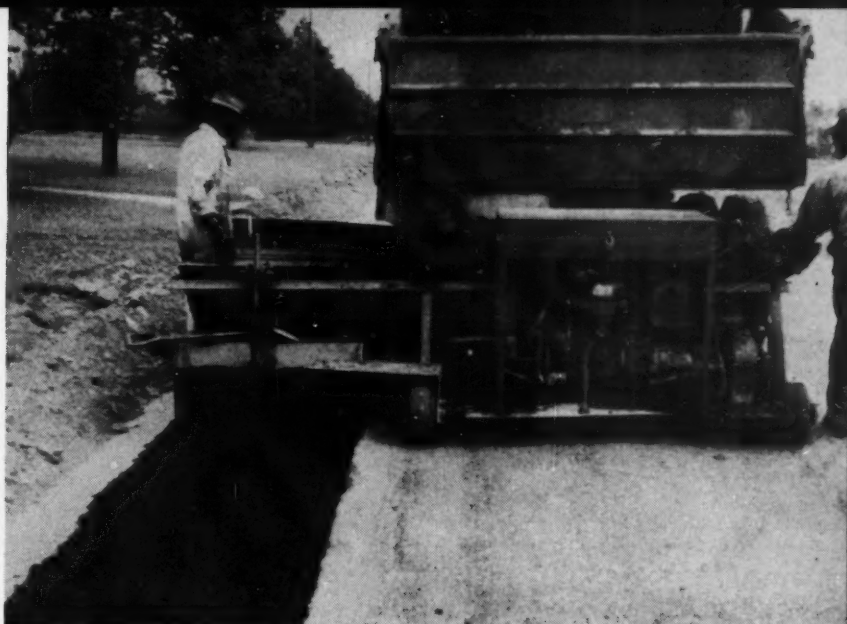
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GRANULATED SLAG is spread with self-propelled All Purpose Spreader for base course without use of side forms.

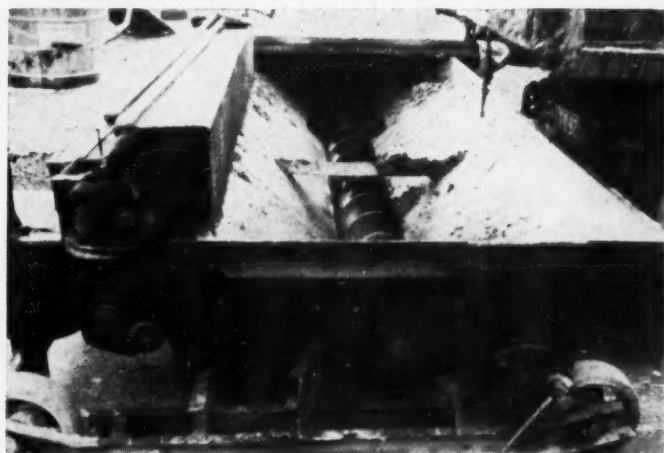




BITUMINOUS CONCRETE is spread by screw-type widening box, developed by McCourt Construction Co., of Akron. Note adjustable strike-off on spreader box.



SCREW-TYPE WIDENING BOX (above) to spread granulated slag is pulled by truck which discharges material. Screw (below) in hopper of box carries material to end of box.



BITUMINOUS CONCRETE is spread with Adnun paver which has one end blocked off so material is carried to other end. Rolls of paver travel on old pavement which thus controls grade.



ASPHALT PLANT prepares mix for transportation to job site.



Page 115

SIDE FORMS (below) are braced to withstand rolling. Spreader box travels on form to control accurately depth of widening material. Recent practice has largely dispensed with use of side forms.

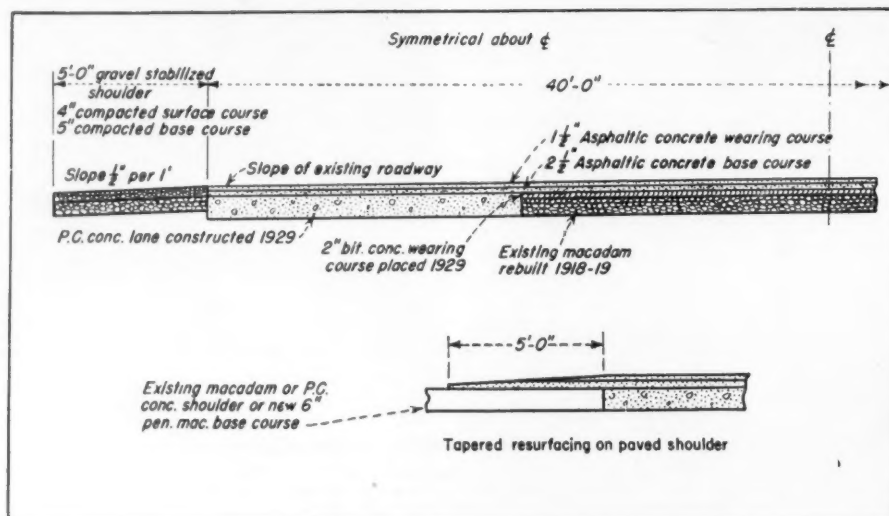
ONE-WAY TRAFFIC (below) is maintained in passing equipment on highway during widening operations.



Resurfacing Salvages Pavement



DURING MORNING HOURS when traffic is relatively light, Eastern Highways Corp. places asphaltic concrete course on inner lane with spreading-finishing machine, here pushing truck ahead as load is discharged.



SUCCESSFUL PERFORMANCE by 2-in. bituminous concrete wearing course during 16 years since it was placed on two inner lanes at time of widening to 40 ft. Influences decision of Maryland State Roads Commission to salvage and improve existing pavement by resurfacing with 4-in. of asphaltic concrete. Typical shoulders are 9-in. stabilized gravel laid in two courses except where paved shoulders already are in existence or penetration macadam is called for to meet roadside conditions.

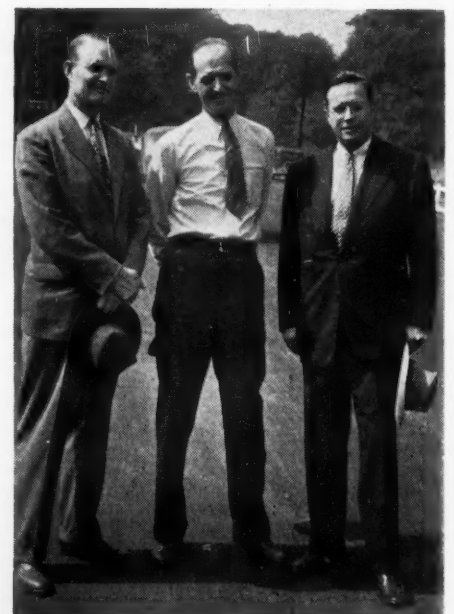
WITH RUN COMPLETED on inner lane (below), paving machine turns around to return in high gear to point for picking up outer lane.



BY ADDING 4 IN. OF ASPHALTIC CONCRETE in two courses to existing pavement built up during the last 30 years on the Baltimore-Washington Boulevard (U.S. 1), the Maryland State Roads Commission is fortifying and improving the 40-ft. paved way to meet the heavy traffic demands on this route, which carried about 24,000 vehicles per day before the war. Part of this load eventually will be diverted to the new Baltimore-Washington Parkway under construction by the Public Roads Administration, but existing U.S. 1 will continue to take the truck traffic.

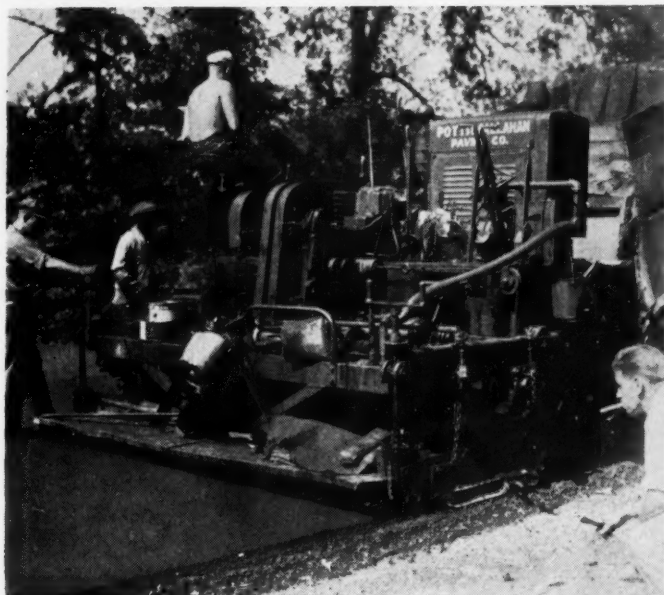
Highway Always Open

Three 1945 contracts totaling 10.3 mi. on this highway in Howard County, under direction of District 3 at Laurel, illustrate methods of resurfacing the existing pavement without unduly impeding traffic. Operations were restricted to half the width at a time. Resurfacing courses, a 2½-in. base course and 1½-in. wearing course, were placed in 10-ft. lanes on the three contracts by self-propelled spreading and finishing machines. The contractors controlled the operations of these machines in such a way as to afford maximum clearance for



RESPONSIBLE OFFICIALS confer on job as E. G. DUNCAN (center), district engineer, Maryland State Roads Commission, meets JOHN L. KRANAU (left), president, and PIERCE FLANIGAN, vice president, Eastern Highways Corp.

BALTIMORE-WASHINGTON ARTERY



CLOSE CHECK on strike-off adjustment of tamping-leveling finisher is maintained by CARL H. ERNEST (with cigar, at right), of Baltimore Asphalt Block & Tile Co., superintendent on contract of American Paving & Contracting Co.



FOR GREATER SAFETY during afternoon traffic rush, spreading-finishing machine on contract of American Paving & Contracting Co. works on outer lane. Tarpaulins on trucks cover loads during 25-mi. haul from mixing plant in Baltimore.

traffic on the highway during the hours of peak movement. All three contractors were Baltimore firms: the Eastern Highways Corp., E. Stewart Mitchell and the American Paving and Contracting Co. The last-named contractor performed the work on its project in association with two other Baltimore firms, Potts & Callahan Paving Co. and the Baltimore Asphalt Block & Tile Co.

Daily Output

Progress on the three contracts ranged from 450 to more than 1,000 tons per day. Two of the contractors, whose paving operations are illustrated by accompanying photographs, hauled the hot-mixed material from permanent plants. The Eastern Highways Corp. trucked its hot mix from a plant located only 7 mi. from the midpoint of its 2.3-mi. contract. A much longer haul was involved in delivering asphaltic concrete to the 4-mi. project of the American Paving & Contracting Co., which trucked the material 25 mi. from an asphalt plant of its associate, the Potts & Callahan Paving Co., in north central Baltimore. These two contractors placed 450 to 650 tons per day.

For another 4-mi. contract completed a little earlier in the construction season, E. Stewart Mitchell erected on a railroad siding adjacent to the highway and not far

UNIT PRICES FOR ASPHALTIC CONCRETE

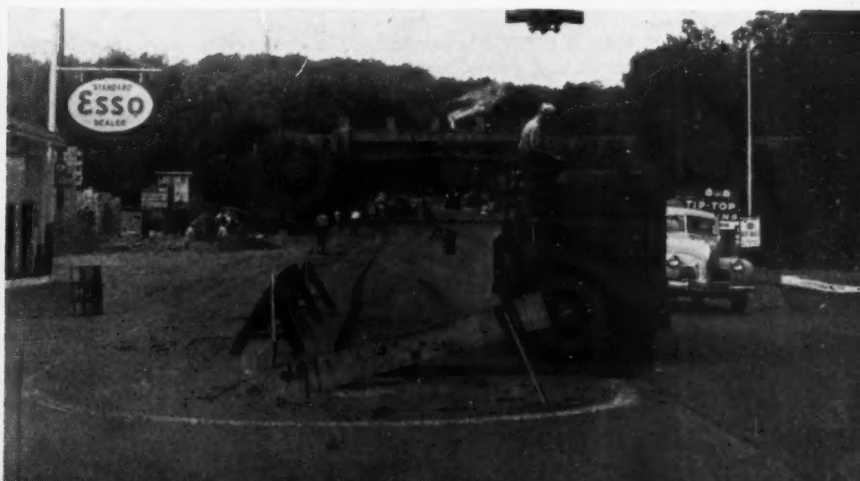
Contractor	Quantity in tons	Unit price per ton	Amount
E. Stewart Mitchell			
Base course, using stone aggregate.....	11,550	\$6.00	\$69,300.00
Base course, using slag aggregate.....	10,395	6.00	62,370.00
Wearing course, using stone aggregate.....	8,500	6.00	51,000.00
Wearing course, using slag aggregate.....	7,650	6.00	45,900.00
American Paving & Contracting Co.			
Base course, using stone aggregate.....	13,100	5.70	74,670.00
Base course, using slag aggregate.....	11,790	5.70	67,203.00
Wearing course, using stone aggregate.....	9,700	5.70	55,290.00
Wearing course, using slag aggregate.....	8,730	5.70	49,761.00
Eastern Highways Corp.			
Base course, using stone aggregate.....	7,450	5.85	43,582.50
Wearing course, using stone aggregate.....	5,400	5.85	31,590.00

Contract of E. Stewart Mitchell was awarded on basis of stone aggregate, and that of American Paving & Contracting Co. on basis of slag. No price was taken on use of slag aggregate for contract awarded to Eastern Highways Corp.



← **HEAVY GRADING** and concrete paving for elimination of Dead Man's Curve are completed by JOHN H. ENSEY, contractor.

AT TRAFFIC INTERSECTION where paving crew ends run on inner lane (below), 10-ton tandem roller compacts freshly laid hot material and irons out longitudinal joint.





↑
RESURFACING PROJECT completed earlier in 1945 on Baltimore-Washington Boulevard, U.S. 1, just north of Howard-Baltimore county line, illustrates built-up property which restricts right-of-way expansion and requires paved shoulders. This section, under direction of District 4, Maryland State Roads Commission, was constructed by American Paving & Contracting Co. with Baltimore Asphalt Block & Tile Co. and Potts & Callahan Paving Co.



→
WHERE PAVED SHOULDER requires tapered edge of asphaltic concrete resurfacing. **WILLIAM JORDAN** (right) chief inspector for State Roads Commission, supervises operation to full satisfaction of his visitors, **E. G. DUNCAN** (center) and **JOHN L. KRANAU**.

Page 118



←
FOR SURFACE SEAL of wearing course, workmen scatter 2 to 4 lb. per sq. yd. of plant-mixed asphalt-treated sand, containing about 2 percent asphalt, preparatory to dragging with truck-drawn broom and rolling with tandem power roller. Sealing is completed within 4 to 5 hr. after paving machine lays wearing course.

PRIOR TO SEALING, surface of wearing course presents open texture which is closed up by light seal of asphalt-treated sand without destroying non-skid quality.

from one end of the job a Cedarapids portable asphalt plant. Hauling from this plant, the contractor was able to lay more than 1,000 tons on a good day.

Paving Machines

All three contractors operated Barber-Greene paving machines of the tamping-leveling type to lay the resurfacing material without forms. The trucks dumped the hot material into the front hoppers of the paving machines, which pushed the trucks along in front of them until the unloading was completed. By virtue of the bridging effect of the pacing machines, the two-course construction corrected irregularities in the existing pavement and produced a riding surface of satisfactory smoothness. Before placing the resurfacing, the State Roads Commission and the contractors took care to repair weak spots in the existing pavement and patch all unstable, teetering slab.

In addition to the shoulders shown on an accompanying drawing, the three contracts involved miscellaneous items and about 35,000
(Continued on page 192)

DEAD MAN'S CURVE is eliminated, in conjunction with other improvements of Baltimore-Washington route (below), by relocation 2,700 ft. long, graded and paved with 9-in. reinforced concrete under contract of John H. Ensey, Baltimore. Cut measures 45 ft. high to top of bank.



INCENTIVES FURNISH THE DRIVE

THE COMING YEAR, 1946, and the years to follow can bring unprecedented prosperity to the people of the United States if the incentives to secure it are provided.

We have the advantage of starting with an economy which has demonstrated a capacity for expansion unequalled in any other country in the world. Our economy has demonstrated, also, one grave weakness—a recurring interruption of the upward trend of production and living standards by wasteful and paralyzing periods of recession. Recovery from each depression always has carried us to new heights of economic welfare, but the toll of the years of blight has been harmful to everyone.

The job ahead of us is a dual one. We must maintain the vitality of an economy which, over the years, has yielded an enormous increase in the American standard of living, and we also must improve its stability.

The Dynamics of American Production

In the last prewar year, 1940, the population of the United States was $3\frac{1}{2}$ times as large as it was in 1870. But the national production, measured in dollars of constant purchasing power, was 10 times as large at the end of the period, and industrial output had increased 20-fold.

In the meantime, the average number of hours of factory workers had been reduced from about 63 per week in 1870 to less than 40 in 1940, while average hourly earnings had more than trebled in dollars of constant purchasing power. Thus "real" weekly or annual wages in manufacturing had doubled over the 70-year period, even though the work-week was cut by 35 per cent. This was made possible chiefly by a tremendous increase in the quantity and quality of the mechanical facilities which were provided in American manufacturing industry. Manufacturing capital investment per worker was multiplied by 6 times over the period in question. But the

return per dollar invested, while it has fluctuated widely between good years and bad, showed no general upward trend over that portion of the period for which measurement is practicable.

Incentives in American Manufacturing

There has been, historically, a remarkably consistent pattern in the division of the realized income from the expanding manufacturing output of America. Reliable statistics are not available for as far back as 1870, but from 1899 through 1939 the average share of wages and salaries has been $82\frac{1}{2}$ per cent against $17\frac{1}{2}$ per cent as the share to investors (including dividends, interest, rents, royalties, and non-corporate profits). There have been, from year to year, relatively minor divergences from this pattern of distribution, but there is no discernible trend during the period away from the averages cited.

It is suggested that the persistence of the average $17\frac{1}{2}$ per cent share of realized income from manufacturing that was maintained for the 40 years preceding World War II may represent the proportion that is needed to produce the dividends, interest, rents, royalties, and non-corporate return that will provide for the continuing investment upon which an expanding productivity such as we have had in the past depends. At any rate, it would seem reckless to depart too radically from such an established pattern at a time when unprecedentedly large private capital investment is counted on to make up for the drastic curtailment of such investment during the war years, and to carry us to the new high levels of civilian production set as our postwar goals.

The Distribution of Manufacturing Income in War

At the beginning of the war, the Government adopted controls and a tax program designed to prevent wartime activity from resulting in un-

duly swollen private returns. Due primarily to huge volumes, the profits *before* taxes of manufacturing industry were very high, but throughout the war its profits *after* taxes averaged returns no larger than they had been in good prewar years. Relative to volume, they were considerably lower than in prosperous years in the past. Again, there can be no complaint at results that generally were in accord with a national wartime policy.

But it is fair to note that the wages of manufacturing labor were allowed to increase substantially during the war. Between January 1, 1941 and April, 1945, average weekly earnings per worker increased by 77 per cent. This was, in considerable part, a result of increased working hours and a shift from low- to high-paid industries, but straight-time hourly earnings on the same jobs increased about 40 per cent against a cost-of-living rise of about 30 per cent.

The net result was to alter drastically the 40-year relationship of the 17½-82½ per cent division of Realized Income from Manufacturing. The share of wages and salaries increased to over 90 per cent, and the investment share shrunk to less than 10 per cent.

Its Postwar Distribution

This wartime shift in the proportion of distributive shares has an important bearing upon current wage controversies. With union demands for wage increases ranging up to 30 per cent, and the economists of the Office of War Mobilization and Reconversion asserting that an average increase of 24 per cent is feasible without raising prices, it is pertinent to inquire how such increases would affect the prewar ratios that governed realized income distribution in manufacturing.

Forecasting is always hazardous, but if we assume (1) that in 1946 we shall reach the \$160 billion level of national output which the Government proponents of general wage increases expect, and (2) that there will be little increase in productivity because of the continuing process of reconversion, and (3) that the Government will succeed in carrying its announced purpose

to maintain present price ceilings, it appears that a 24 per cent general wage increase would reduce the share going to capital from 17½ per cent to 11 per cent even allowing for its increased return resulting from the repeal of the excess profits tax. The prewar ratios would be about maintained if wages remained at present levels.

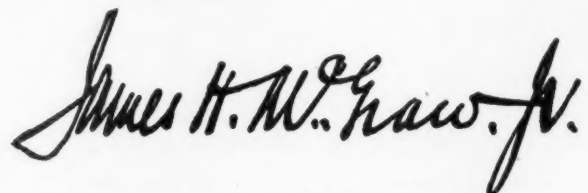
Conclusion

Since the maintenance of these prewar ratios was accompanied by an unparalleled rise in the "real wage" of American workers, there is a powerful *prima facie* case for not tinkering with them. It should be noted, however, that some economists think that the size of the investment share of manufacturing income tends to provide more capital than can be absorbed by a mature economy, and thus contributes to those breaks in the expansion of the economy which, as stated at the outset, have been its principal blight.

Regardless of what may ultimately prove to be the validity of this view, no one can responsibly contend that at this early but crucial stage in the reconversion process is the time to test it. Now, no one knows whether, or what dimension of, additional wage increases can be supported without forcing up prices or reducing profits to a point that will discourage vitally needed private capital investment.

We want high and increasing wages in American manufacturing. We need them to provide an active incentive to workers to support expanding productivity, as well as to continue the trend of rising living standards in America. Equally, we need a continuing profit incentive of sufficient attractiveness to call forth the new investment upon which expanding productivity depends.

We can never attain our dual objective if we push one of these aims so far and so fast that it defeats the other.



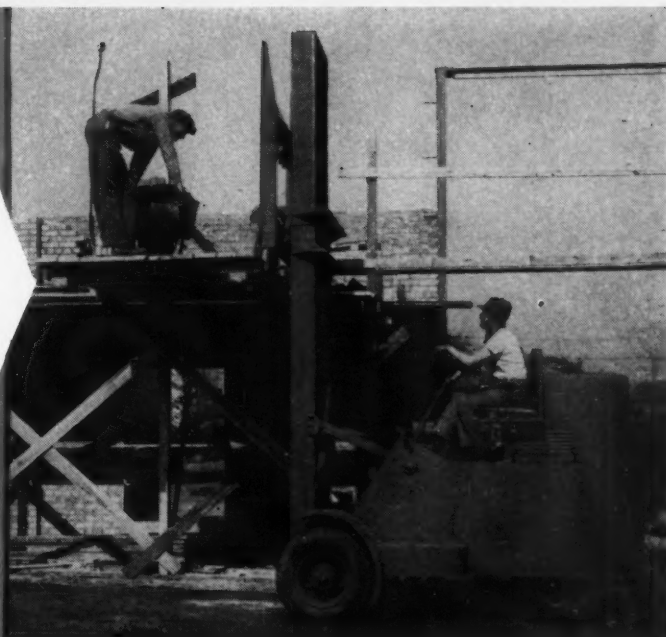
President, McGraw-Hill Publishing Co., Inc.

THIS IS THE 43RD OF A SERIES

A New Wrinkle in the BUILDING INDUSTRY

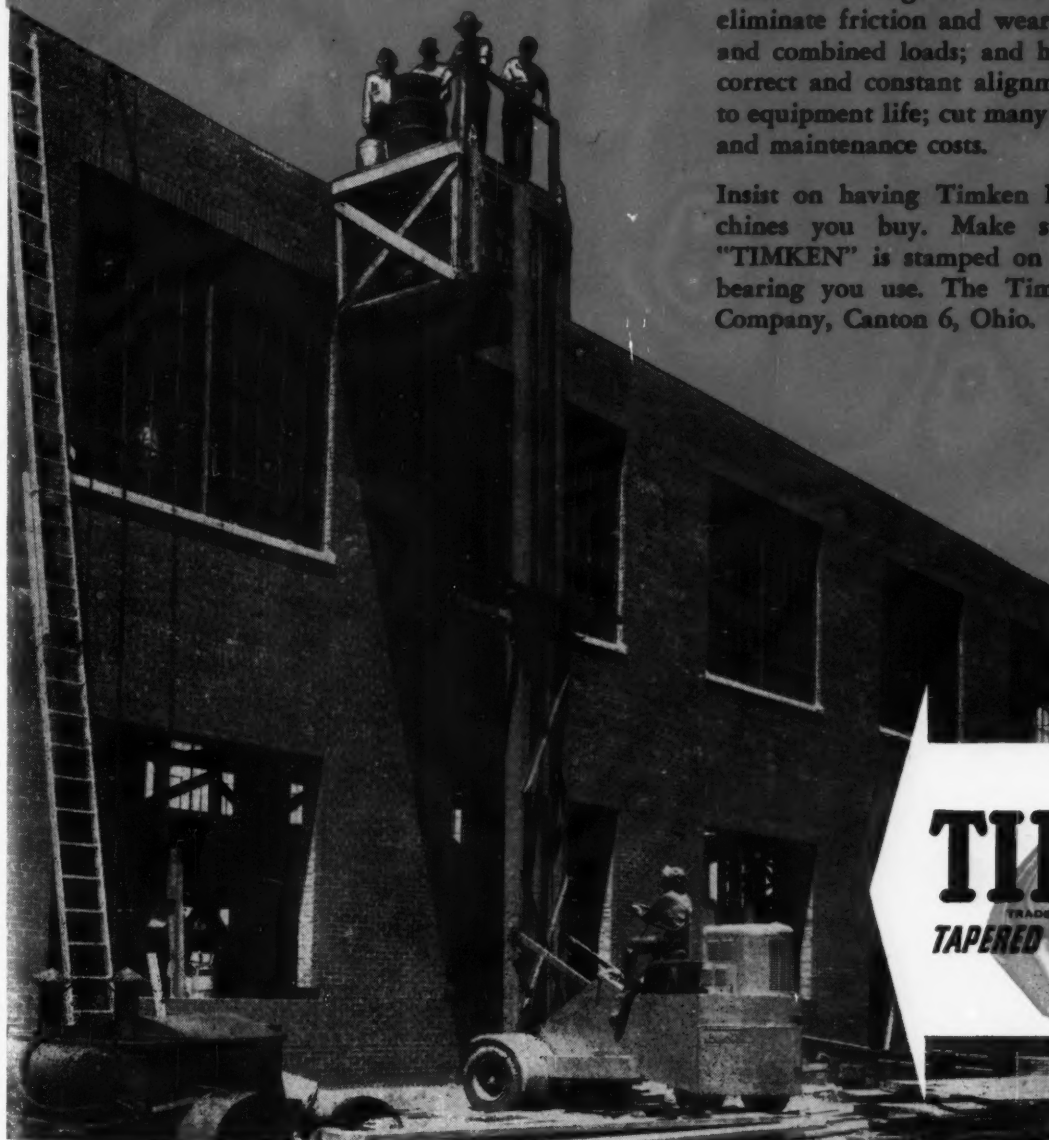
Ross Lift Trucks manufactured by Ross Carrier Company, Benton Harbor, Michigan are well-known and widely used for material handling in industrial plants of all kinds. Now they have found a new outlet for their versatility, strength and endurance. This does not require any lengthy description; the pictures tell the story.

To help give these lift trucks maximum speed,



power, maneuverability and dependable, low-cost service, Timken Tapered Roller Bearings are applied in front wheels (drivers); differential; pinion; steering wheel (rear); and kingpin; 14 Timken Bearings are used in each truck. They eliminate friction and wear; carry radial, thrust and combined loads; and hold moving parts in correct and constant alignment. They add years to equipment life; cut many dollars off operating and maintenance costs.

Insist on having Timken Bearings in the machines you buy. Make sure the trade-mark "TIMKEN" is stamped on every tapered roller bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



ELEPHANT PULLS LOG through swampy Assam jungle to loading area beside Ledo Road.

Signal Corps Photo

JOBS

oddities



CARDBOARD COPS hold traffic warning signs on Connecticut highways. Thirty lifesize figures of state police stand guard at curves, hilltops and dangerous locations.

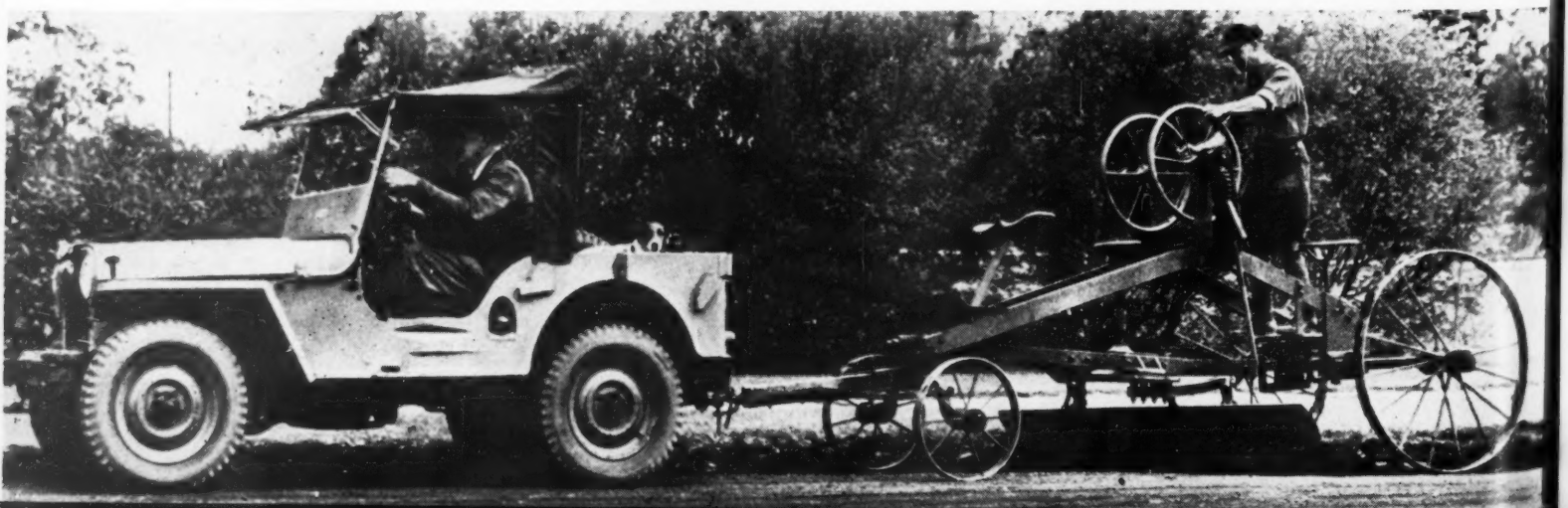
Wide World Photo

Page 122

JEEP (below) is used for road maintenance by New York State Institute of Agriculture on Long Island. Here Willys universal jeep pulls scraper equipped with 6-ft. blade.



LOAD OF 312 TONS at 39-ft. 6-in. radius over bow is handled by "Paul Bunyan," huge floating derrick built by Wiley Equipment Co., of Port Deposit, Md., for use by Army Engineers in construction of new lock at Sault Ste. Marie in Michigan. Hull is 150 ft. long, 65 ft. wide and 12 ft. deep, with 1/2-in. plate used throughout. Farge is cut into watertight compartments by plate bulkheads.



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. . . the contractor used

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Mortar Cement used for Gaseous Diffusion Process
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Nichols, District Engineer. Kellex Corporation, New
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Contractors.

CM-MC-6

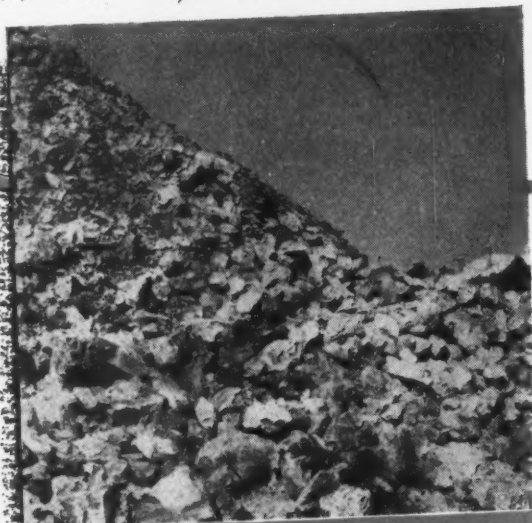
SUNDAY EVENINGS—American Broadcasting Company (Blue) Network—U. S. Steel's "The Theatre Guild on the Air"

January 1946 — CONSTRUCTION METHODS — Page 123

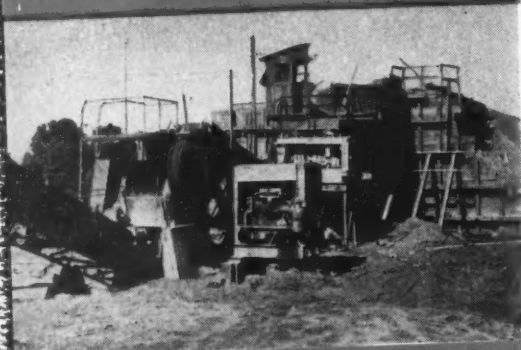
CRUSHING FLINTROCK

**ONE OF THE HARDEST AND MOST
ABRASIVE ROCKS IN THE WORLD**

with **PIONEER
EQUIPMENT**



Flintrock boulders, near Joplin, Mo. equalled in abrasiveness by only one known South African rock deposit.



Pioneer No. 56 Primary Crusher Unit—Travelling Grizzly Feeder and 2436 Primary Jaw Crusher.



Pioneer Plant owned by Harold Youngman at Baxter Springs, Kansas.

● This is one of those interesting jobs that men who make their living in pit and quarry enjoy reading. It begins with the Santa Fe railroad which has recently installed new high-speed trains on its main line west of Kansas City. It was found that limestone ballast did not stand up under severe service.

Chats, which are rejects from lead and zinc mines near Joplin, Mo., were available, but their size was minus $\frac{3}{8}$ " and too fine for ballasting the main line for high-speed trains.

Also available were great piles of flintrock which the mine operators had rejected as uncrushable. The mining section of W.P.B. advised that this rock was the most abrasive known in the U. S. and equalled only by one known rock deposit in the world located in South Africa.

Harold Youngman of Baxter Springs, Kansas, took the contract to crush this flintrock to $1\frac{1}{2}$ " minus. The following PIONEER equipment is doing the job:

- a PIONEER No. 56 Primary Crusher, which consists of a Grizzly feeder and a 2436 Primary Jaw Crusher
- a PIONEER 1536 intermediate jaw crusher
- a PIONEER 48-V plant which includes a 1036 jaw crusher, a 40" x 22" roll crusher and a 4' x 12' vibrator screen.

Because of the extreme abrasiveness of the rock, it was found that better results could be obtained by using the four crushers and closing down the top opening on the jaw crushers, thus reducing the angle between the jaws and increasing the manganese life several times.

PUT IT UP TO PIONEER

You may never have a job like Mr. Youngman's, but whatever your job you'll want Pioneer equipment—the dependable equipment built with extra margins of performance for extra profits.

Pioneer
ENGINEERING WORKS

Jaw Crushers • Roll Crushers • Screens • Conveyors • Feeders • Washers

ENGINEERS and
MANUFACTURERS of
QUARRY • GRAVEL
AND
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Air[★] Travels First Class THROUGH SPIRATUBE

*New flexible tubing — non-collapsible, retractable — *moves air, powdered, granular or other light solids anywhere, easier, with minimum resistance to flow because it's uniquely spiral-stitched.*

When you need tubing that is non-collapsible and retractable, add this specification — *spiral-stitching* — and make sure of utmost efficiency.

Spiral-stitching provides a smooth channel — no ridges inside to restrict passage, create eddies or collect dirt. It bends around corners with only the slightest reduction of free area.

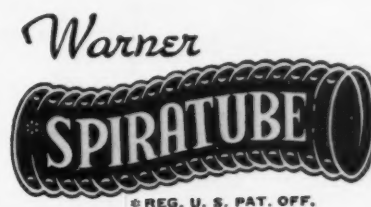
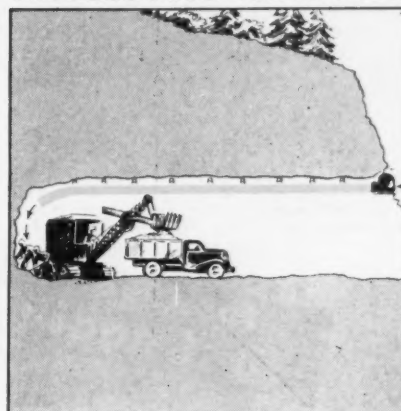
There is no exposed metal, inside

or out. The spring steel helix core is spiral-stitched *into* the fabric and the fabric is covered with tough, durable thermoplastic. Even the couplings are covered. SPIRATUBE is safe where sparking hazard would prohibit use of other tubing.

Check All Non-Collapsible Tubing Against These SPIRATUBE Features:

- No ridges inside tubing
- Bends at any point with only slight reduction in free air area
- Built-in coupling — no fittings needed
- Retracts to about 1/4th extended length
- Far lighter than metal ducts or moulded tubing
- Takes up least space when retracted
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CONSTRUCTION EQUIPMENT NEWS

JANUARY 1946 REVIEW
of Construction Machinery and Materials



HYDRAULICALLY-OPERATED TRUCK LOAD-ER. 1-yd. capacity, for attachment to "cab-over" or conventional truck chassis, is claimed to be versatile, labor saving and economical for snow removal, maintenance of road surfaces, clearance of slides, spreading of straw and manure, picking up leaves and street sweeping. Advantages: (1) One-man operated; (2) fully hydraulic operation by one lever from cab of truck; (3) shovel may be stopped in any position; (4) all operations in view of driver; (5) operation cycle, 6 sec.; (6) shovel arms may be locked (automatically) into body to add stability when used for spreading; (7) rugged construction. —Western Industrial Eng. Co., 3301 Medford St., Los Angeles 33, Calif.

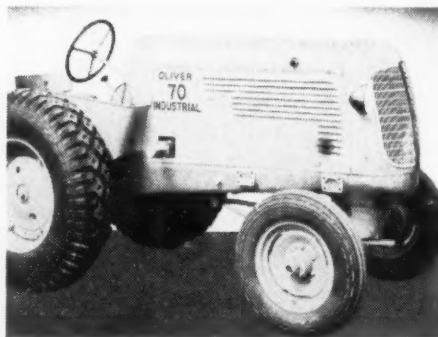
IMMERSION-TYPE STEAM TANK HEATER for speeding emptying of tank cars and trucks is suited for use with any material, the viscosity of which can be lowered by heating. Consists of a number of lengths of Brown Fintubes connected in series and in-



let and outlet steam lines. Heaters have low center of gravity, and can be handled safely by one man or easily by two men. Cross handles aid in positioning heater over discharge outlet in car, in blocking heater at various depths and removing the unit after car is empty. Available in two sizes, No. 642 for use with tank cars and No. 442 for use with tank trucks.—The Brown Fintube Co., 160 Filbert St., Elyria, Ohio.

★ ★ ★

POST-WAR INDUSTRIAL MODELS of Cletrac crawler and Oliver wheel-type tractors are now being developed for use in construction and maintenance projects. First of the wheel tractors to be sold through an indus-



trial organization is now available: Model 70, a 6-cylinder tractor with 36-hp. engine. Models 80, 60 and 99 will be added to the line as soon as practicable and a complete line of allied equipment will be available when development can be completed.—Oliver Corp., 400 W. Madison Ave., Chicago 6, Ill.

**for 1946! —
first again!**

**Two 1946 Three-Wheel Rollers
AVAILABLE NOW!**

**Model VM-31 10-ton
Model VM-32 12-ton**

• These new, better Buffalo-Springfield Rollers lead the coming procession of other efficient 1946 Buffalo-Springfield models.

Write or call your Buffalo-Springfield dealer today.

Watch for announcement of the 1946
**3-Wheel Rollers 6 to 8 tons
Tandem Rollers 3 to 17 tons
3-Axle Tandems 9 to 17 tons
Trench Rollers**



BUFFALO-SPRINGFIELD

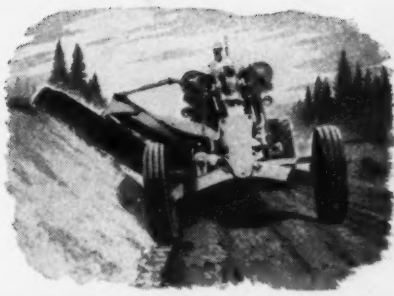
The Buffalo-Springfield Roller Co.

Springfield, Ohio

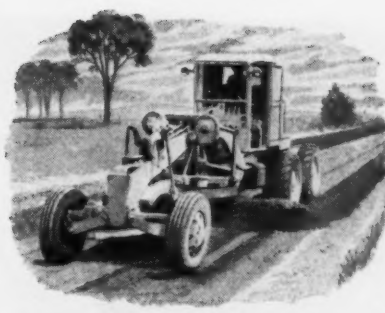
*The Oldest and Largest Builder of Road Rolling
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The All-Around Grader for Year-Around Service

WHEN YOU BUY an Adams Motor Grader, you buy a real *all-purpose, all-year* machine—a machine designed and built to deliver fast, efficient, economical service . . . *in all seasons and all weather.*

Big and husky, Adams Motor Graders have the power, traction and flotation to tackle any job within the range of a motor grader—plus the advantage of fast, power-operated cab controls that accurately position the blade for all types of surface, ditch and bank work—quickly, easily.

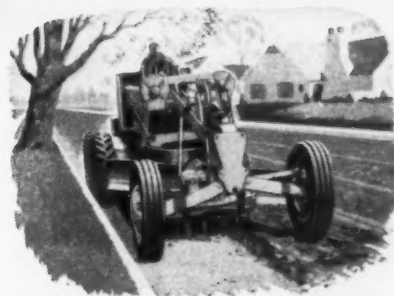
But this only begins to tell the story of Adams exceptional versatility. Eight overlapping forward speeds enable operators to obtain and maintain fastest practical working speeds on every type of operation. In addition to the road operations pictured here, Adams Motor Graders are adapted to a wide variety of work on—streets and alleys—airports—irrigation ditches—dam construction—and other grading projects.

Investigate the many all-around, year-around superiorities of Adams Motor Graders. See your local Adams dealer.

J. D. ADAMS MANUFACTURING COMPANY • INDIANAPOLIS, INDIANA



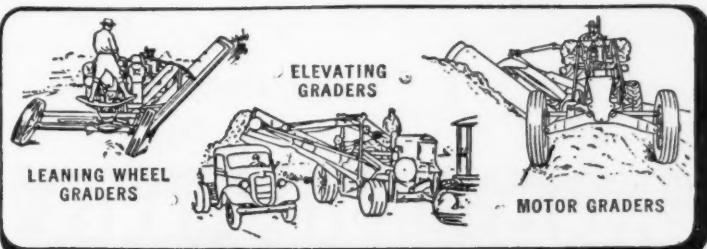
ROAD and STREET MAINTENANCE



SCARIFYING



SNOW REMOVAL



Adams

ROAD-BUILDING AND EARTH-MOVING EQUIPMENT

YOU'LL GET *MORE*
OUT OF A
MULTI-PURPOSE
LORAIN!

CAREFUL job analysis shows that the vast majority of construction operations can be broken down into the seven basic work classifications shown below. Since no one can tell exactly which of these types of work—or combinations of them—your present or next contract will bring, the wisest investment is in equipment that can be adapted to every kind of work. And no other machines will fit into any and all classifications as well as multi-purpose Lorain Cranes and Shovels!

When you plan your next equipment purchase, look beyond the immediate job—consider the long range possibilities of what you buy. In stamina, in basic engineering and adaptability to every kind of work, Lorain Cranes and Shovels are designed to give you *years* of service on *all* kinds of jobs.

The five convertible and interchangeable front-ends shown actually give you five machines in one—an all-purpose outfit ready to cover the entire range of excavating, material handling and building jobs.

Ask your nearest Lorain distributor—or write us direct—for the facts and figures. Among the large and small crawler-mounted Lorains, rubber-tired Lorain Moto-Cranes and rubber-tired Self-Propelled cranes there's the right machine for your conditions. Let us help you pick the right one now for many future years of profitable service.

*You can do all these jobs
with one machine
—A LORAIN!*

DEEP EXCAVATIONS WET BOTTOM JOBS BANK, CUTS and SLOPES CASTING MATERIAL HANDLING ROCK WORK LIFTING SERVICE

Easily and quickly convertible to dragline, clamshell, shovel, backdigger or crane work, one Lorain will give you the same work range as several special purpose machines! Available on crawler or rubber-tired mountings.

Reg. Trade Mark
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THE
THEW SHOVEL CO.
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CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

Illinois Resurfacing

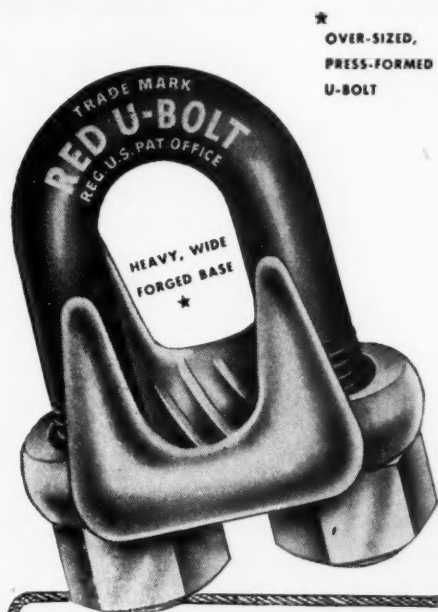
(Continued from page 95)

elevator. Stone was handled out of an undertrack pit and sand out of railroad cars, while fine sand was taken from a stockpile to which trucks delivered it. Rated capacity of the plant's hot material elevator is 137½ tons per hr. The Simplicity double-shell dryer, in which cold aggregate enters the outer shell and exits through the inner shell, has even greater capacity.

Daily production depended largely upon the speed of laying. Two Barber-Greene finishing machines operated each day during part of the job. The largest quantity laid in a 10-hr. day during this time was 1,002½ tons, or 401 batches. Later the job operated with only one paving crew, which used the two finishers alternately on the two lanes of binder course to save moves back and then ran one machine back to lay top. On an average day, the job laid 800 tons of binder or 600 tons of surface course in 10 hr.

Resurfacing courses were placed

(Continued on page 132)



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OVER-SIZED,
PRESS-FORMED
U-BOLT

STRONG!

You won't find a stronger clip. It's first choice for men who must depend on safe wire rope fastenings! A product of the American Hoist & Derrick Co., St. Paul 1, Minnesota.

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By placing your order for Steel Forms with us now, we can reserve the necessary steel for your spring requirements and we can make delivery on time.

If you delay, the steel may not be available, and we will be unable to assure you satisfactory delivery.

Heltzel makes flexible and rigid steel forms for building concrete curbs, combined curb and gutter or sidewalk, also steel forms for modern highway and airport construction.

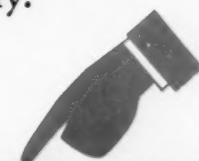
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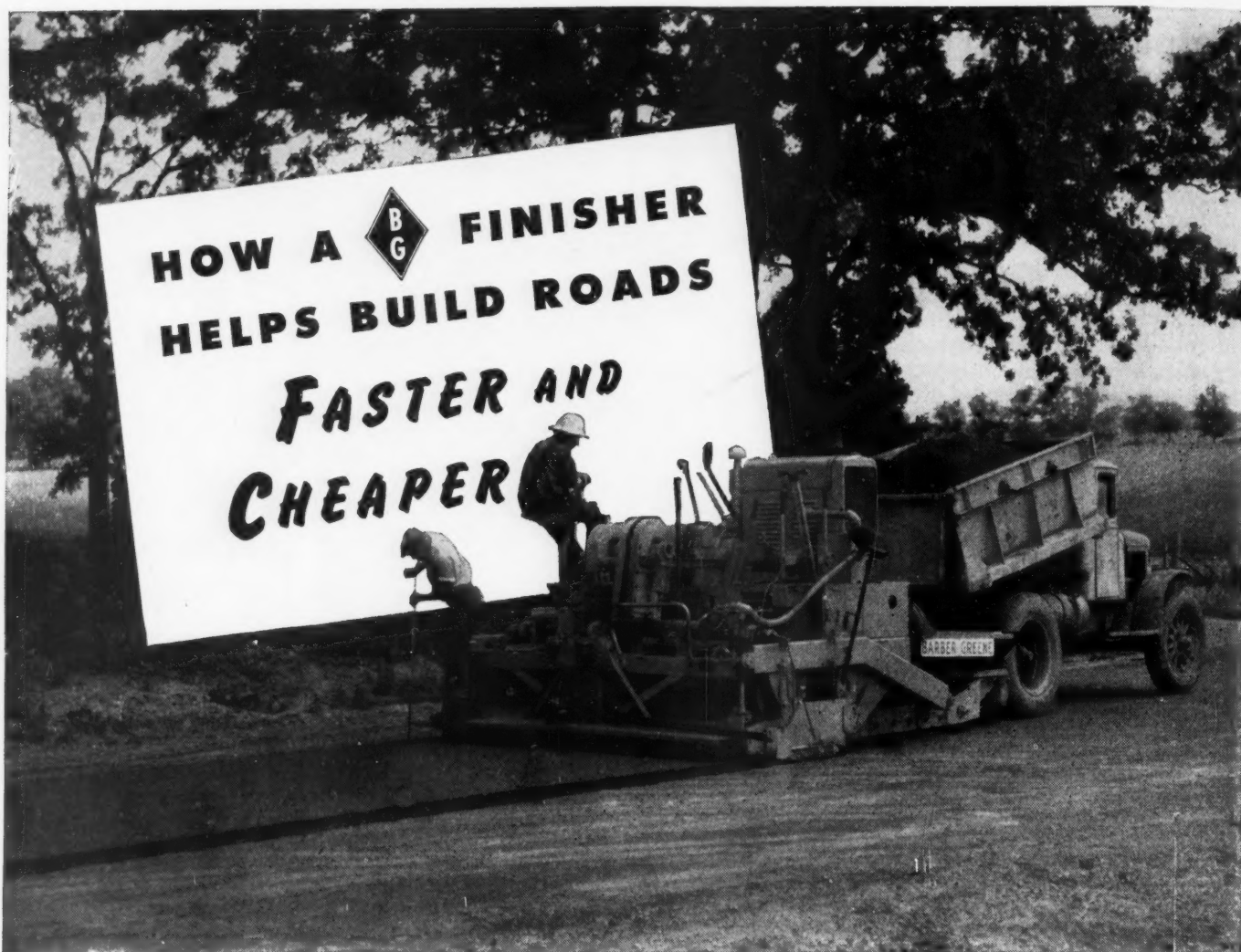
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BUILDS IT BETTER

BINS, Portable and Stationary
CEMENT BINS, Portable and Stationary
CENTRAL MIXING PLANTS
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
BITUMINOUS PAVING FORMS
ROAD FORMS (with lip curb and integral curb attachments)
CURB FORMS
CURB AND GUTTER FORMS
SIDEWALK FORMS
SEWER AND TUNNEL FORMS
CONCRETE BUCKETS
SUBGRADE TESTERS
SUBGRADE PLANERS
TOOL BOXES
FINISHING TOOLS FOR CONCRETE ROADS



• Here's a machine that performs three jobs at once. And you can keep it moving steadily—all day long. In rapid succession, truckloads of asphalt mix are mechanically spread . . . "kneaded" and thoroughly tamped in place . . . and automatically leveled—all in one operation.

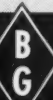
Moreover, the Barber-Greene Tamping-Leveling Finisher helps provide fast, cheap road construction by reducing the amount of rolling for adequate compaction . . . eliminating hand labor behind the machine . . . decreasing truck delay . . . cutting out the hazards encountered in other methods.

You'll find that a B-G Finisher saves

days and dollars on every black top paving job. It handles mixes extremely difficult or impossible to lay by other means . . . maintains a mat of uniform thickness, ranging from $\frac{1}{4}$ -inch to 6 inches . . . holds an accurate crown . . . and tightly seals joints with adjacent strips.

Before the call comes for the hurry-up resurfacing of worn-out highways, and the speedy construction of new roads and airports, plan to add a B-G Tamping-Leveling Finisher to your equipment. Write for literature outlining the functions and performance of this versatile machine. Barber-Greene Company, Aurora, Illinois.

Barber-Greene



Constant Flow Equipment



DOWN to ROCK BOTTOM



L-57

L-47

PRODUCTS
 Portable Compressors •
 Stationary Compressors • Rock
 Drills • Wagon Drills • Core
 Drills • Portable Hoists • Paving
 Breakers • Trench Diggers •
 Sheeting Drivers • and other
 Pneumatic Tools

If it's rock-bottom drilling costs you want there's a Sullivan profit-maker for every job. From the small versatile L-1 to the husky, hard-hitting L-57, every Sullivan drill is packed with power but cushioned on air.

Both the 45-pound L-47 and the 55-pound L-57 drills are equipped with the exclusive Sullivan thrifty dual-valve that "makes air do more work." The dual-valve positively

controls the volume of air for highest efficiency and gives a *controlled cushion ahead of the stroke*.

Wherever low-cost footage is important — contractors, municipalities, public utilities and counties turn to the complete line of Sullivan hand-held drills. Ask your nearest Sullivan distributor or branch office for details on hand-held drills and the other Sullivan products that can help you get your construction costs down to rock bottom.

Sullivan Machinery Company, Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Company, Ltd., Dundas, Ontario.

SULLIVAN

OFFICES { Birmingham • Boston • Butte • Chicago • Claremont • Dallas • Denver • Duluth • El Paso
 Huntington • Knoxville • Los Angeles • Middlesboro • New York • Philadelphia • Pittsburgh
 Portland • Salt Lake City • San Francisco • Seattle • Spokane • St. Louis • Washington, D. C.

(Advertisement)

Machinery Costs More Than Oil or Grease

Plant Managers Dread Costly Machine Replacements Not to Mention Production Losses Incurred by Machine Stoppages.

Plant managers know that each piece of machinery is only of value to them so long as its bearings, gears, chains and other moving parts withstand the heavier loads and increased speeds imposed by modern industrial demands. Above all, they realized that proper lubrication is the chief requisite of efficient and continuous machine operation. It is understandable that they were unwilling to continue to spend dollar after dollar for replacements of scored bearings, chipped gears, and broken chains whose loss could be avoided by proper lubrication from the start. The increased speeds and heavier loads of modern operation further accentuated the need for better lubrication. So aggravated did the situation become that unless proper lubricants were developed, many of the advantages that improved design and tougher metals imparted to machinery, would be lost. Scientific investigation of the problem by Fiske research engineers brought out two facts. The first was that no one oil or grease would suffice for all industrial applications but a line was required to meet the several conditions. The second was that all lubricants must have in common, greater film strength, better lubricating qualities, and offer protection against rust and corrosion. As the result of this research the LUBRIPLATE line of lubricants was developed. LUBRIPLATE does reduce friction and wear to a minimum. It is waterproof so prevents rust and corrosion. The "stay put" quality of LUBRIPLATE is exceptional. It offers greater film strength without causing "drag." Unsolicited letters from Plant Managers and Maintenance Men the country over relate how LUBRIPLATE lubricants cut replacement costs, reduce machine stoppage, save on power consumption, and permit heavier bearing loads and increased machine speeds. In the LUBRIPLATE line there is a sufficient variety of densities and consistencies . . . oil and grease type . . . to satisfy all lubrication needs. LUBRIPLATE distributors the nation over are in a position to make prompt delivery of your LUBRIPLATE requirements. LUBRIPLATE Service Engineers welcome the opportunity to help you with your lubrication problems. A complementary copy of the "LUBRIPLATE SERVICE HANDBOOK" containing valuable information on the subject of lubrication will be sent you upon request. Write for it today.

**ORDER
LUBRIPLATE**

**FROM YOUR
LOCAL
DEALER**

There is a LUBRIPLATE Dealer near you . . . at the other end of your local telephone. He stands ready to prescribe the LUBRIPLATE Lubricant that will make your machinery last longer, run smoother and produce more product at less cost. He has a complete stock on hand to give you prompt delivery. Give him a ring.

LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

LUBRIPLATE
FISKE BROTHERS REFINING CO.
NEWARK 3, N. J. TOLEDO 2, OHIO

DEALERS FROM COAST TO COAST
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

(Continued from page 129)

to a cross-section which called for 1-in. batter in the 2½-in. depth at each edge, but the batter actually needed and used was about 1½ in., leaving a 17-ft. 9-in. width of wearing surface on the asphaltic concrete built up from 18-ft. slab. As indicated by accompanying photographs, the men in charge of paving adjusted the cutoff plates of the finishing machine to produce the desired cross-section.

Prior to laying binder course, the old concrete was cleaned and primed with emulsified asphalt. Each course was rolled with a Galion 10-ton three-wheel roller, followed by an 8-ton tandem.

For the relatively light travel on State Highway 17, a 2½-in. resurfacing on a sound foundation of old slab is judged to be adequate. Skill in laying hot asphaltic concrete with Barber-Greene finishers and experience in using the special accessory devices contributed to the quality of the job.

For the Illinois Division of Highways, Wesley W. Polk is chief highway engineer, and Kendrick Harger, district engineer. For White Consolidated, Inc., contractor, Chicago, Jess Green was superintendent, H. E. Akins was plant foreman, and Alfred E. Swayne was paving foreman.

★ ★ ★

Rubber-Tired Tractor-Scraper

(Continued from page 96)

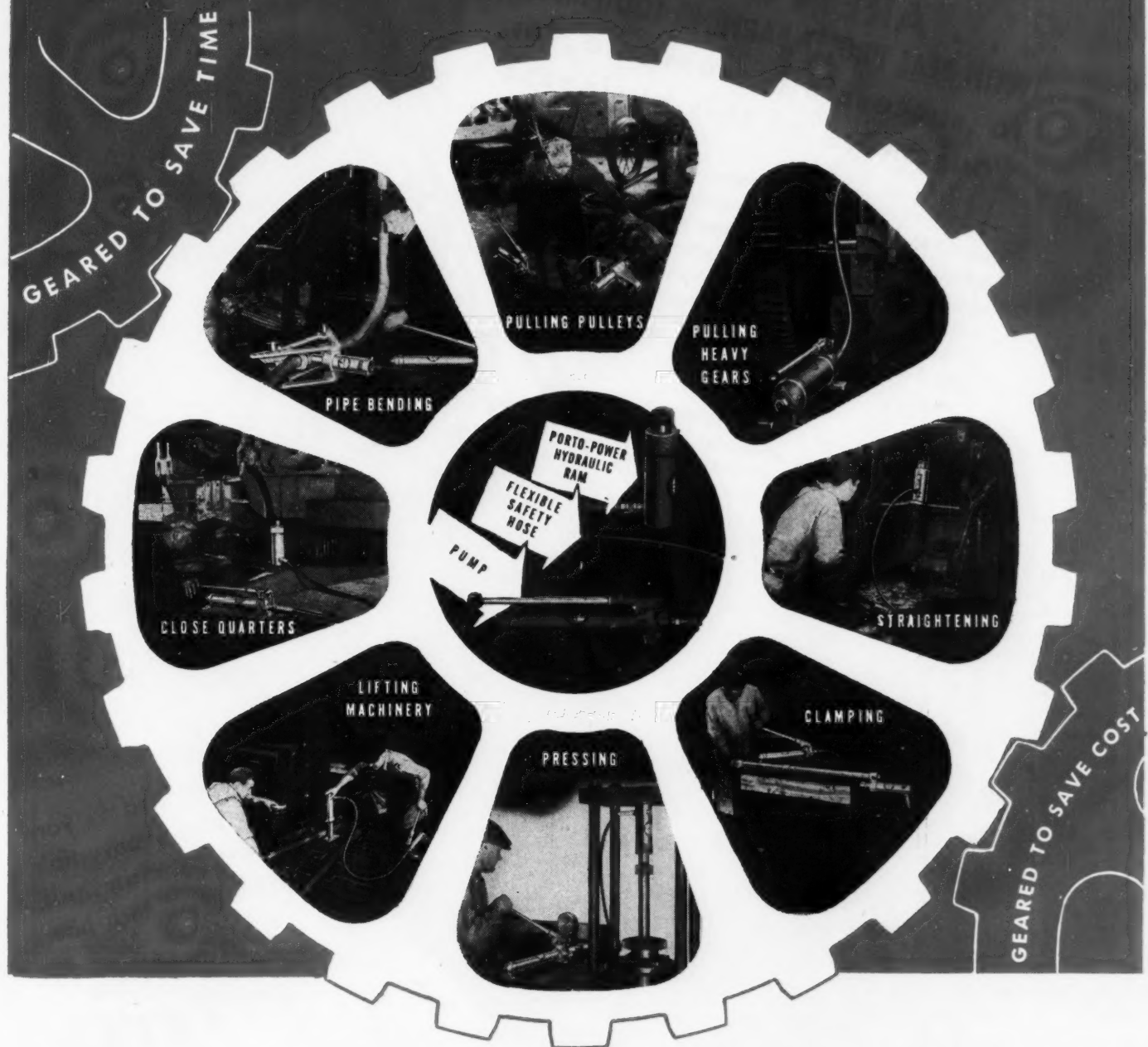
and gravel amounts to about 1,500 cu. yd. per km. (3,150 cu. yd. per mi.)

In the old river bed, the Tournapulls were snatch-loaded by a D7 tractor. Despite loose material and poor traction, the units were able to get 8 to 9 cu. yd. per load. On the first section graveled, the haul distance was 18 km., and the contractor continued to use the same source of gravel until the haul length increased to 20 km. The haul road was fair, except for being very dusty, and the average cycle time for this haul was one hour.

On the grading operations, the contractor used six tractor-drawn LeTourneau scrapers, one LP, four LS and one G. In addition, the job employs two rooters, a tractor-bulldozer and a tractor-angledozer.

Porto-Power

THE ALL-AROUND TOOL FOR CONSTRUCTION



BUILT to be versatile, Blackhawk Porto-Power is the miracle hydraulic tool of 1001 uses. Compact, easily transported and operated by one man, this all directional jack brings tons of hydraulic power right to the job. Dependable for production operations, versatile for maintenance

work, it readily builds up into combinations to push, pull, bend, spread, press, and clamp. Produced in 7, 10, 20, and 50-ton models. For more information on Porto-Power (and also Blackhawk Hydraulic Jacks and Wrenches), see your industrial supply distributor or write us.

A Product of BLACKHAWK MFG. CO., Dept. P2316, Milwaukee 1, Wis.

BLACKHAWK

★ \$1,000,000,000

construction program
now getting under way

... ARE YOU READY
WITH REAL PROFIT EARNING EQUIPMENT
to successfully compete for
your share of this business?

You'll need fast, rugged, economical-to-operate
machines — like up-to-the-minute MICHIGAN
Mobile SHOVELS-CRANES. They can be relied
upon to stay on the job day after day with a
minimum of maintenance or repair — they've
proven it on scores of tough civilian and military
jobs the world over . . .

IT WILL PAY YOU TO INVESTIGATE
these profit-earning advantages of
MICHIGAN Mobile SHOVELS-CRANES
— write today for data and speci-
fications in Bulletin CM-16.

★ WPB estimate for 1946

$\frac{3}{8}$ yard and $\frac{1}{2}$ yard
Shovels — convertible
to crane, clamshell,
dragline, trench-hoe.

6, 10 and 12 ton
CRANES

FINGER TIP
AIR CONTROLS

MICHIGAN

POWER SHOVEL COMPANY

BENTON HARBOR MICHIGAN

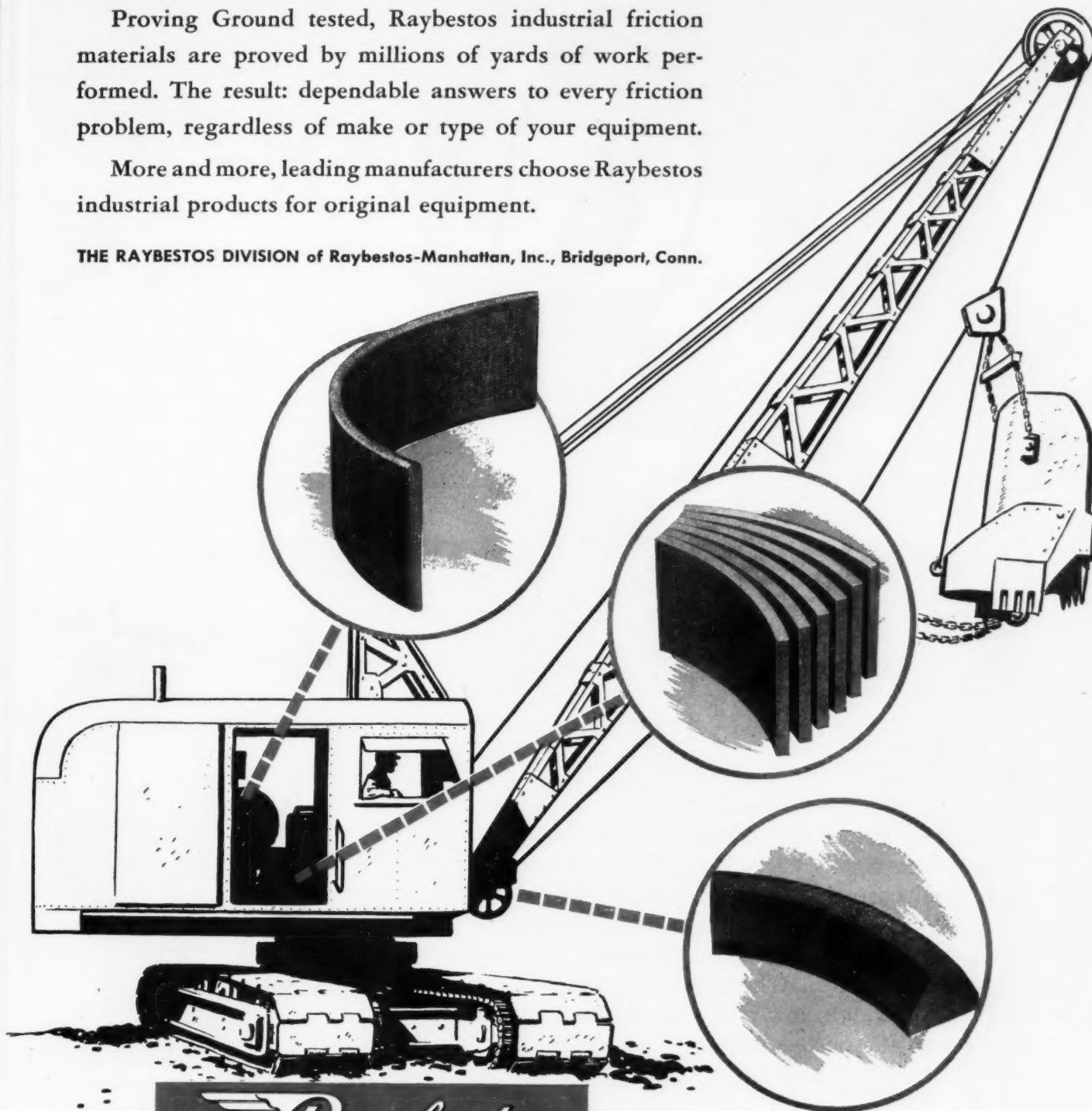
FRICTION CARRIES THE LOAD

Drag... swing... hoist... wherever power passes through friction, Raybestos has the right material to do the job *right*.

Proving Ground tested, Raybestos industrial friction materials are proved by millions of yards of work performed. The result: dependable answers to every friction problem, regardless of make or type of your equipment.

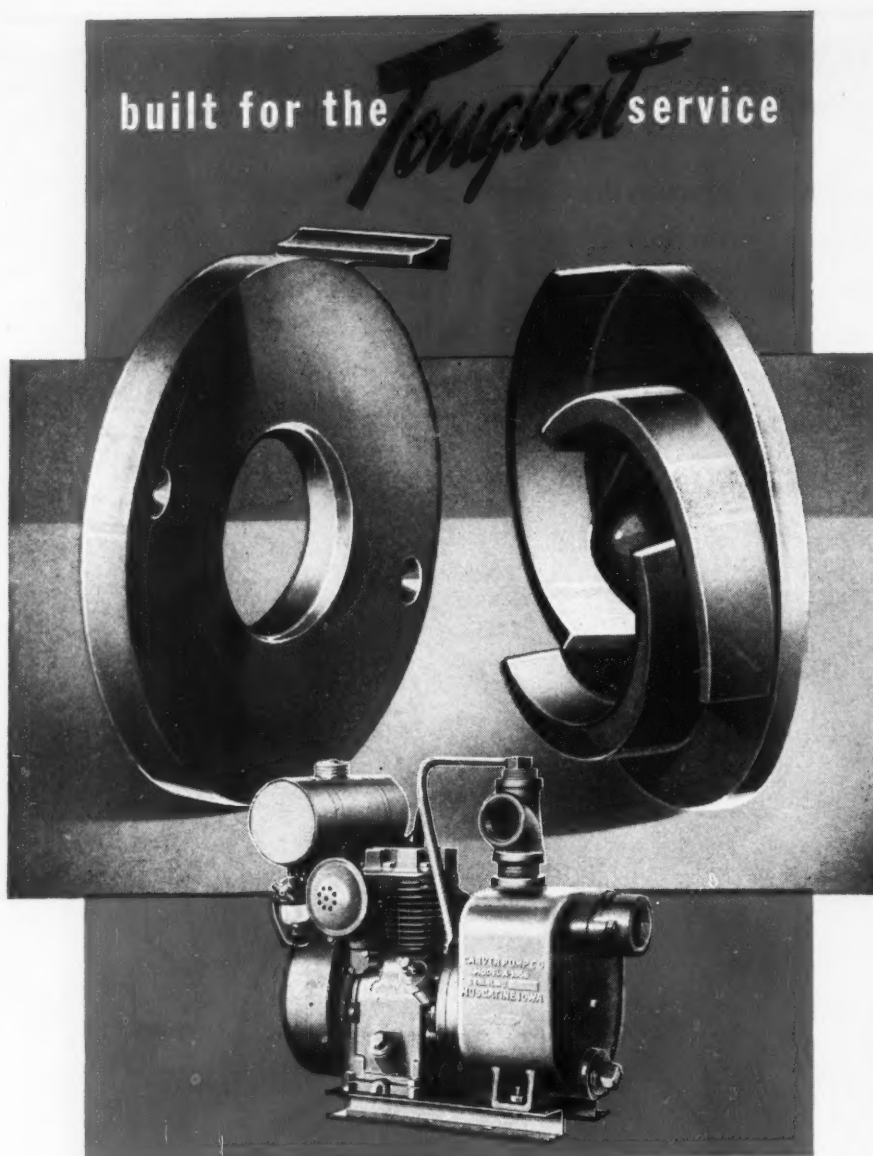
More and more, leading manufacturers choose Raybestos industrial products for original equipment.

THE RAYBESTOS DIVISION of Raybestos-Manhattan, Inc., Bridgeport, Conn.



Raybestos
INDUSTRIAL
FRICTION MATERIALS
Only single source of all four friction materials
— Full Metallic, Semi-Metallic, Woven and Molded

Raybestos engineers will be glad to recommend the proper friction material for applications that have developed chronic trouble.



● Every feature of Carver Pumps is designed to withstand the toughest operating conditions. Impellers are scientifically designed with web-reinforced vanes confining wear to one side. Renewable liners carry a cast lug protecting the scroll casing at the impeller cut-off where wear is greatest. Both parts are cast from special alloy and ground to close tolerance to keep performance high. When wear eventually occurs, their quick, low-cost replacement makes the pump as good as new.

THE CARVER PUMP CO.
Muscatine, Iowa



Dual-Lane Highway

(Continued from page 93)

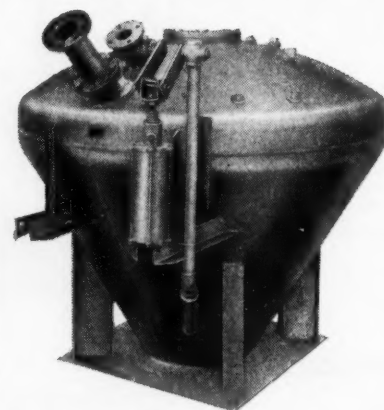
proportioned concrete providing early age flexural strength of 900 lb. per sq. in. The bridge was constructed by C. E. Maxwell & Son, Columbus, Kansas.

Concrete Pavement

Two subgraders, a Standard-Lewis and a Flynn, were used to prepare pavement subgrade. The Standard-Lewis unit rides the pavement side forms and is pulled by a tractor attached to cable hitches at the sides of the subgrader. A cutting edge excavates material which is carried on a conveyor belt and deposited beyond the pavement form. A baffle plate at the back side of the conveyor belt prevents

(Continued on page 140)

*Move Cement by
Air-Floating It!*



The ROBINSON AIR-ACTIVATED CONVEYOR SYSTEM is practical and efficient, saving in air and maintenance. It has been used on numerous big construction jobs as well as in process plants.

You can order the entire system installed including compressor, piping, storage tanks, etc. or just the activator, such as illustrated, to be used with your own accessory equipment.

Write for illustrated Bulletin No. 310

ROBINSON AIR-ACTIVATED CONVEYOR SYSTEMS

Division of MORSE BOULGER DESTRUCTOR CO.
211-C EAST 42nd STREET, NEW YORK 17, N.Y.
Representatives in all Principal Cities



THE NEW NO. 102 MOTOR GRADER

A new year is upon us. The picture has changed considerably during the past year. Having piled up an enviable war record, Galion enters 1946 with confidence . . . with a new line of motor graders and rollers. Bearing the well-known Galion name plate, these new models are worthy successors to our line of road machinery which has won so much confidence throughout the world. The Galion No. 102 motor grader, indicated above, is just one of the new heavy duty units to carry the Galion name, your guarantee of the best, in 1946.

THE GALION IRON WORKS & MFG. CO.

Main Office and Works:

GALION

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**FOR
OVER
75
YEARS
A
MARK
OF
QUALITY**



SHOVELS - CRANES - DRAGLINES

**LIMA LOCOMOTIVE WORKS INCORPORATED
SHOVEL AND CRANE DIVISION, LIMA, OHIO**

Capacities

SHOVELS

$\frac{3}{4}$ Yd. to 5 Yds.

CRANES

13 Tons to 100 Tons

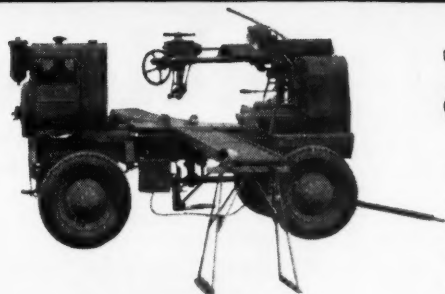
DRAGLINES

Variable

idle crawlers earn no money



...here's the way to whip them back in service
with amazing savings in time and labor!



MR. CONTRACTOR . . .

Your dealer probably has Rodgers Track Servicing Presses in his service department for the purpose of helping you maintain your equipment. If he hasn't and your requirements won't justify your having a Rodgers Press of your own, urge him to investigate the savings of a Rodgers. It will pay you both!

Rodgers crawler track Presses

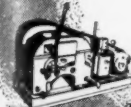
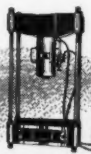
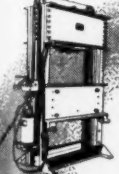
IT'S A WASTE OF TIME to lay up crawler-tractors a couple of days for routine track maintenance—it's unnecessary to slug the pins and tug or burn stubborn nuts. A Rodgers Track Press does the track service job . . . so easily . . . so fast. It takes just an average 3 or 4 hours machine time to service two large strings of track—and you can do it on the job with a *Portable Rodgers*.

An exclusive Rodgers feature is the Retractable Jaw which eliminates lifting the track over a stationary jaw and assures proper bearing support against the inner side of the rail, thus properly spacing the rails, eliminating any binding action—leaves tracks flexible after servicing. The Rodgers Track Wrench is the handy answer to tight, frozen nuts.

You can get a Rodgers Crawler-Track Press in portable models: 2 wheel trailer or 4 wheels; and in stationary shop models. *Write now* for complete details; or see your crawler equipment dealer—he will tell you what a Rodgers can do to save you time and labor.

Shop Presses

Portable Presses



Power Pump Units



Crawler-Track Presses

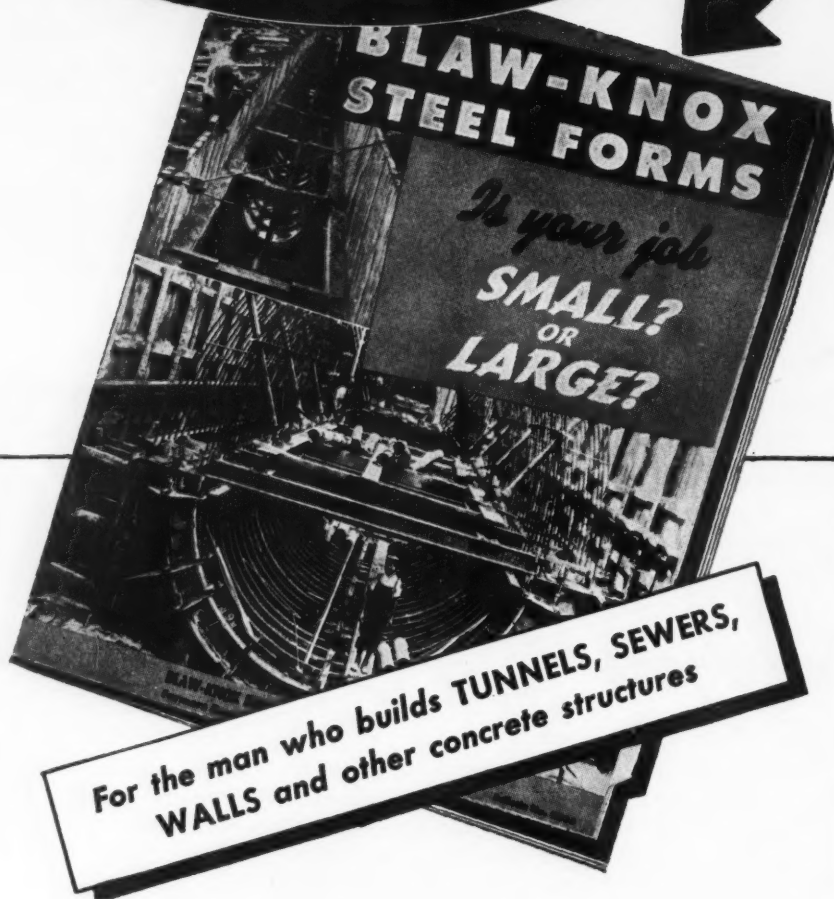
Rodgers Hydraulic, Inc.

hydraulic power equipment

7403 Walker St., St. Louis Park, Minneapolis 16, Minn.



THIS BULLETIN
tells **HOW ... WHEN ...**
WHERE to specify



SIMPLE DIAGRAMS—TELEGRAPHIC EXPLANATIONS

... make this Blaw-Knox Bulletin not only useful and profitable, but quick and easy to read as well.

One suggestion taken from it may save you thousands of dollars.

Send for Bulletin No. 2035 on your letterhead.

BLAW-KNOX DIVISION of Blaw-Knox Company
2086 FARMERS BANK BUILDING, PITTSBURGH, PA.

BLAW-KNOX STEEL FORMS

(Continued from page 136)

material over-riding or spilling off the belt. The subgrader can be pulled in reverse direction without rotating the position of the machine and the baffle plate automatically transfers to the opposite side of conveyor belt.

Paving equipment included the following units: Koehring 34-E paver; Lakewood-Jaeger spreader with Jackson tube vibrator; Lakewood-Jaeger double-screed finisher; and Koehring longitudinal finisher. Straightedging, flat or hand finish and joint installation took place behind the longitudinal finisher.

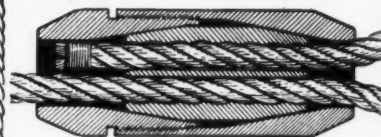
The dual roadways, each 22 ft. wide, were uniform 9-in. thick non-reinforced concrete slabs. Dummy-type longitudinal center and transverse contraction joints were installed; expansion joints were placed only at construction joints, road intersections and cross-overs. Dummy joint material consisted of 1/8x4-in. bitumen-impregnated felt composition strips installed by Flex-Plane machine.

A 2-cu. yd. Tournapull proved
(Continued on page 142)

LOOK INTO...

Cabl-ox

THE NEW WIRE ROPE CLAMP
That Really Holds the Line!



CABL-OX clamps work on a brand new wedging principle. Holding power increases with the load and exceeds tensile strength of rope used. Does not crush and weaken rope like old style U-clips. Assembly is fast, neat ... saves breakdowns, equipment, injuries and expense. Can be used over and over. Cadmium plated.

Cabl-ox

Made in all sizes from 1/8" to 3/4".
For all wire rope applications.

• **FASTER** • **SURER** • **SAFER**
• **STRONGER** • **ECONOMICAL**

Ask your distributor or write for illustrated folder and prices.

NUNN MANUFACTURING CO.
2125 Dewey Avenue, Evanston, Illinois



For more working horsepower

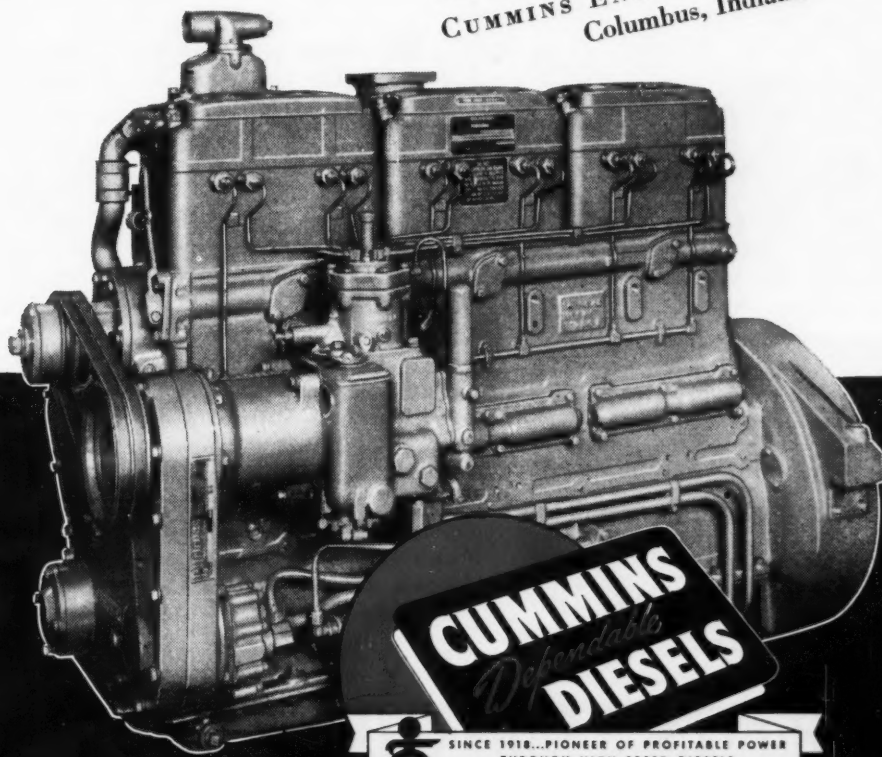
... and less engine weight . . .

your best investment in power is

a Cummins Dependable Diesel!

Within almost the same weights and mounting dimensions, your choice of 150-200-275 hp . . . weights as low as 101½ lbs. per horsepower . . . for all types of heavy-duty earth moving and material handling equipment. Illustrated here is the 150 hp (max.) Model HBI-600 Cummins Dependable Diesel.

CUMMINS ENGINE COMPANY, INC.
Columbus, Indiana



CUMMINS
Dependable
DIESELS



SINCE 1918...PIONEER OF PROFITABLE POWER
THROUGH HIGH SPEED DIESELS

MEMO
Re: SNOW REMOVAL
*Let's speed up and
 lower the cost of
 Snow-loading!
 Looks like HAISS
 snow buckets
 can do it.*
J.L.D.

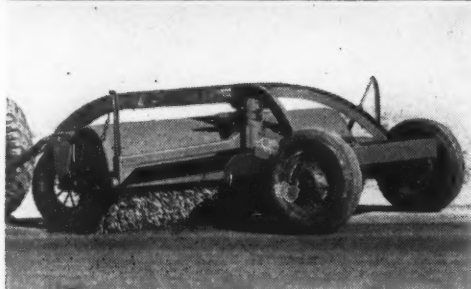


HAISS
SNOW BUCKETS

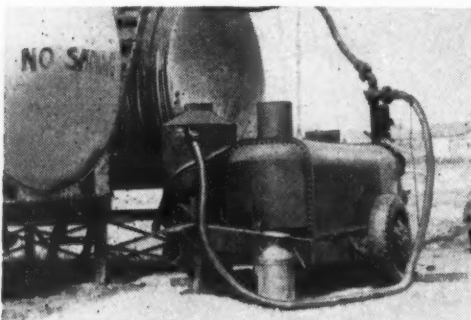
For catalogs, prices and deliveries, write or wire—

GEORGE HAISS MANUFACTURING CO., INC., 139th St. & Canal Pl., New York 51, N. Y.

USE GRACE EQUIPMENT IN 1946 TO COMPLETE JOBS ON SCHEDULE



GRACE SWEEPERS FOR ALL JOBS



CIRCULATING TANK CAR HEATER

WHETHER you have a big construction job or a routine job of keeping streets swept . . . Grace has the proper equipment to get the job done on time.

Grace Sweepers, either motor or two-way axle driven are ready to go to work for you now.

The Grace Circulating Tank Car Heater is the quickest way to heat a cold car of asphalt, pumping up to 250 GPM at temperatures to 450°.

Other Grace equipment includes: 600-Gallon Maintenance Kettle, Sheepsfoot and Pneumatic Rollers, Drag Brooms, and Garbage Collection Bodies.

WRITE TODAY FOR FULL DETAILS

W. E. GRACE MANUFACTURING CO.
 6005 SOUTH LAMAR STREET DALLAS, TEXAS

(Continued from page 140)
 efficient in finishing shoulders and dividing strips and served to waste or transfer surplus earth to locations where it was needed. Cross-overs and intersections were constructed of concrete pavement tinted a reddish hue to alert traffic entering the roadways proper. Following final finish of shoulders, dividing sections, ditches, and backslopes, a straw mulch was placed to aid seeding.

Contractors and Engineers

Concrete pavement was constructed by the Atkinson-Windle Co., Chillicothe, Mo., and final finish of grading by O'Dell & Riney Construction Co., Inc., Kirkwood, Mo. C. W. Brown is chief engineer of the Missouri State Highway Department. Resident or project engineer C. L. Crawford, Rolla, Mo., was the department's representative of the above described work.

★ ★ ★

Florida

Limerock Roads

(Continued from page 91)

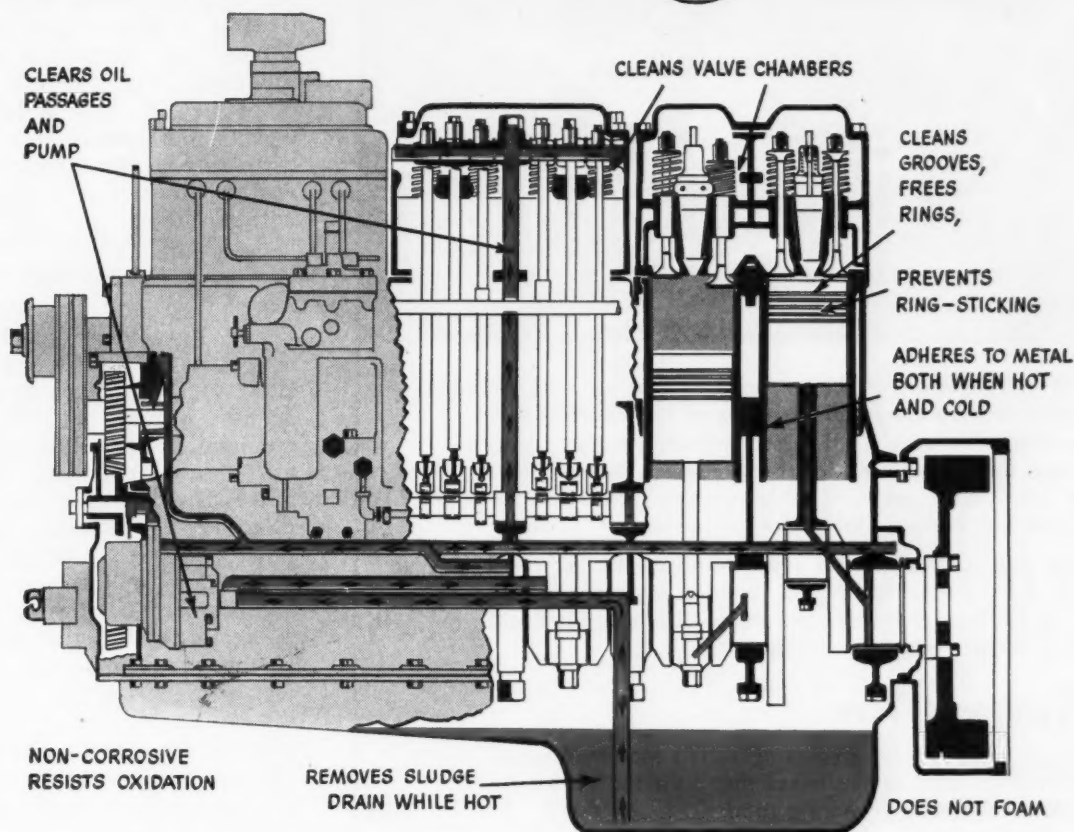
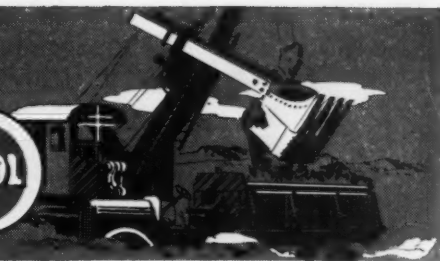
wise broken up to such an extent that no pieces larger than 3 in. remain bonded together. This material is windrowed to the bottom of the already excavated widening trenches. The bared existing limerock is scarified and spread to the full width of the proposed new base course and thoroughly watered and rolled to obtain uniform density. The top surface of this layer is made parallel to the finished template and grade.

New limerock material is then hauled from the point of storage to the project and dumped on the prepared lower course. The rock is spread uniformly with shovels, forks, or by bulldozers or other equipment. During the dumping and spreading operations the rock is thoroughly saturated with water.

After the watering and rolling of the upper course the entire surface is thoroughly scarified to a depth of not less than 4 in. which means that a bite into the lower course is

(Continued on page 144)

STANDARD ENGINEERS NOTEBOOK



Heavy duty oil cleans engines while they're running

Clean carbon, sludge, gum and other harmful matter from heavy truck engines without tearing them down by purging with RPM Heavy Duty Motor Oil.

It will even loosen stuck rings if they are not cemented in too tightly with accumulations of sticky, burned-on gum.

Selected base oils plus patented compounds give RPM Heavy Duty Motor Oil the ability to act on and remove carbonaceous deposits and keep them dispersed in the oil so they can be drained from the engine. The recommended purging procedure follows:

1. Drain present oil from crankcase while hot.
2. Renew filter element to trap abrasive particles

that may be carried into circulation during purging. 3. Fill crankcase with RPM Heavy Duty Motor Oil. 4. Run engine at a fast idle for two hours, maintaining water jacket temperature of approximately 200° minimum. 5. Drain again while hot and refill with RPM Heavy Duty Motor Oil. 6. Place engine in regular service and drain at one-half normal drain period or 750 miles, whichever comes first, for two or three drains. Check oil frequently as removal of deposits may temporarily increase oil consumption. 7. Drain while hot. Check oil filter and replace when necessary. 8. Refill with RPM Heavy Duty Motor Oil, returning to regular oil drain and filter change period, and continue to use RPM Heavy Duty Motor Oil.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif., or California Commercial Company, 30 Rockefeller Plaza, New York 20, N. Y.

FOR EVERY JOB A **STANDARD OF CALIFORNIA** TEST-PROVED PRODUCT



"Lay Asphalt in Snow and Rain?" Asks the Contractor

Yes, many contractors have done just that with KOTAL Master Mixes. An Indiana city engineer confessed he was amazed at the results when his contractor, working long before the normal time for spring repairs, merely swept the snow and water from the potholes and laid the KOTAL Mix right on the cold stone base.

And, that's not all! After slight tamping, traffic rolled over the repaired roads and found a remarkably firm, stable surface, practically the equal of any asphalt laid under ideal summer conditions.

Six Years of Use

have demonstrated the value of KOTAL Master Mixes as all-weather, easy-to-use mixes that help the contractor achieve tough, long-wearing roads.

Low Cost Application

KOTAL Master Mixes do not require skilled help to lay. Savings are shown on both time and labor costs.

The contractor who is looking ahead to those early spring repairs will find NOW a good time to study the benefits of KOTAL Master Mixes:

Eight Working Features of KOTAL Master Mixes

EASY TO USE. Quickly mixed, ready to lay. No preheating or drying.

STABILITY. Cure quickly and permanently. Do not shift, ravel or pick up. Open sooner to traffic.

WORKABILITY. Do not adhere to equipment. Work easily.

LONG-TERM STOCK PILES. Can be stock-piled for many months without losing workability.

SAVE TIME. Quickly made stock piles ready for immediate use without frequent fresh mixes.

SAVE LABOR. Actual road records prove fewer labor hours required.

SAVE MONEY. Savings in time and labor mean economies in road costs.

EXTEND PAVING SEASON. All-weather workability permits more months of operation.

Write for your copy of booklet which tells the story of KOTAL Master Mixes. We will also send you the name of your nearest supplier.



KOTAL COMPANY • 52 Vanderbilt Ave. • New York 17

KOTAL Master Mixes
The Advanced All-Weather Aid in Building Better Roads

(Continued from page 142)

made of not less than 1 in., thus assuring a more perfect bond between the upper and lower courses. A road machine or motor patrol grader then begins to shape the base to exact crown and cross-section. The blading is followed by rolling and watering by a truck having a tank and spray bars. This finishing operation is continued until the entire depth of base is bonded and compacted into a dense unyielding mass, true to grade and cross-section. The finishing of the base is performed at the approximate rate of the laying and in general follows the laying of rock within 4 days.

Curing Period

The completed base course is opened to traffic for a period sufficient to cure the base properly; a 30-day period is desired. Traffic during this period is distributed so as to cure the entire area of the base. The contractor is required to maintain the base to a true surface until prime coat of tar is applied. After the base has been under traffic the required curing period the base is again tested with template and straightedge and any irregularities are brought to the required cross-section by blading.

Hand sweeping of the base quite often supplements the mechanical blowers and brooms in removing these loose materials. The tar prime material is then applied at a rate of approximately 0.2 gal. per sq. yd. with a pressure distributor. This prime coat must thoroughly coat the surface and must be uniformly distributed so that no pools will form. The prime material, usually a Grade RT-2, must conform to the requirements of the Standard Specifications for Highway Materials, and Methods of Sampling and Testing, of the American Association of State Highway Officials, Designation M52-42. The material is distributed at a temperature of between 100 and 150 deg. F.

After the priming of the base, traffic is excluded until the engineer is satisfied that the maximum penetration is obtained, usually requiring several hours. The base is then covered with a light, uniform layer of clean sand to blot any excessive prime material.

Preparatory to the application of a bituminous surface the base is again swept clean to remove all objectionable materials. The department has used in the main for this

(Continued on page 156)

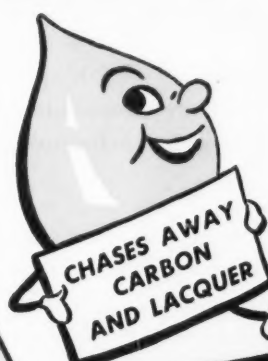
WHICH

OIL

DO YOU USE?



-OR HARD-WORKING TALPEX THAT LUBRICATES AND DOES 4 EXTRA JOBS?



An oil that merely lubricates—or that does only one or two of the other critical jobs in your engines—is a lazy oil. With today's operating conditions . . . the high cost of repairs . . . the scarcity of good spare parts . . . you simply can't afford to use a lazy oil.

To get the utmost in performance from your engines, use hard-working Shell TALPEX. This versatile oil has *all* the properties needed to do the many critical jobs necessary to keep your engines running smoothly and efficiently under the most severe operating conditions.

SHELL TALPEX

1. Has high detergency. Helps keep carbon, lacquer and foreign particles from adhering to pistons and rings, valves, ports.
2. Has exceptional Oxidation Stability. Holds to a minimum the formation of sludge, lacquer and other products of deterioration.
3. Has low Carbon-Forming Tendency. Reduces ring sticking and wear. Lengthens engine life.
4. Is non-corrosive to alloy bearings. Protects all lubricated engine parts against corrosion.

If the oil you now use is not doing all these jobs, it's lazy—should be changed to hard-working Talpex. Ask the Shell man to show you why.



TALPEX

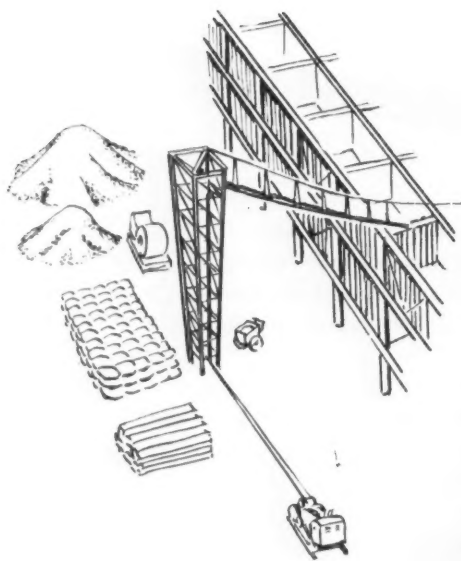
**THE ALL-PURPOSE,
HEAVY-DUTY LUBRICANT**
for trucks, buses, tractors, shovels,
stationary and marine Diesels.



Keep Your Feet on the Ground...

Why buy expensive machines for jobs that "American" Hoists will handle perfectly for thousands of dollars less?

Modern cranes, shovels, conveyors, etc., have their own job applications. We build cranes ourselves, BUT there are thousands of jobs where an "American" Hoist is adequate—*often better*—and involves a much smaller investment.



The five models of "American" General-Purpose Hoists cover almost every requirement up to 5 tons. Of welded construction, they're strong, rugged, long lasting. They're easily controlled, easily adjusted, easily accessible. They're remarkably flexible, too—a one-drum unit can be expanded in the field to a three-drum unit with slewing attachment!

"American" also builds Air-Controlled Contracting Band Hoists up to 25,000 lbs. capacity and Derricks of all types—Stiffleg, Guy Rope, Gallows Frame, Tower, Barge, Steel Erector. See your nearest "American" Distributor or write us.



American
HOIST & DERRICK CO.

St. Paul 1, Minnesota

CHICAGO

NEW YORK

SAN FRANCISCO





ON LONG & SHORTER HAULS

One of a fleet of
TERRA-COBRAS operating on a Trans-
Pacific air base on the West Coast

WOOLDRIDGE

EARTHMOVING EQUIPMENT

Includes



SCRAPERS

Tractor-drawn for handling heaping yardages from 6 to 28 cu. yards.



★ POWER CONTROL UNITS

Single and multiple drum with universal or roller fairleads.



★ BULLDOZERS

Tough and rugged design for standard makes of tractors.



★ TRAILBUILDERS

Adjustable angle-blades for standard tractor mounting.



★ RIPPERS

Available in light, medium and heavy duty models with two sizes to each model.

**DISTRIBUTOR SALES & SERVICE
FACILITIES IN ALL PRINCIPAL
AREAS & FOREIGN TERRITORIES**



Wooldridge Terra-Cobra self-propelled earthmovers consistently maintain speed up to 21 m.p.h. fully loaded.

Positive two-wheel steering control eliminates the necessity of slowing down for rough travel, sharp turns, passing on narrow strips, or spreading on soft fills. Faster round trips from cut to the fill result in greater total yardages at a higher profit and lower yardage cost. *Investigate fully, today. Write for complete Bulletin TA-425.*

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MANUFACTURING COMPANY

SUNNYVALE • CALIFORNIA • U. S. A.

TERRA COBRA

**Hi-Speed Self-Propelled
EARTHMOVERS**

CLEVELANDS

Have What It Takes...



... For Dependable Economic Trenching Performance

STAMINA...

SPEED...

VERSATILITY...

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BALANCE...

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**Quality-Built, For
Top Performance In Any Type of Soil or Terrain**

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CLEVELANDS Save More... Because They Do More

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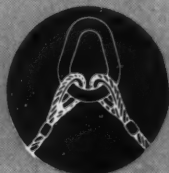


RING & ACCO-LOC SPLICE

NO ONE SLING IS THE ANSWER TO ALL MATERIAL-HANDLING PROBLEMS



EQUALIZING THIMBLE
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PEAR-SHAPE LINK
& ACCO-LOC SPLICE



TRU-LOC LONG
EYE & SHACKLE



U-LOC LOOP
& BRAIDED WIRE ROPE

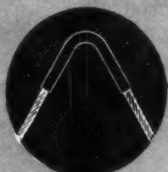


OPEN SOCKET & HOOK



ACCO-LOC LOOP SPLICE

LET HAZARD SLING ENGINEERS ADVISE, THEN...



BENT SEAMLESS
STEEL TUBING



TRU-LOC ROUND EYE



TRIANGULAR LINK
& U-LOC LOOP FOR
BRAIDED WIRE ROPE



DOUBLE CLOSED
SOCKET
& SHACKLE



ACCO-LOC SPLICE
& HOOK



ACCO-LOC SPLICE
& CHAIN



ACCO-LOC SPLICE
& ARMORED LOOP



TRU-LOC OVAL EYE



TRU-LOC CLEVIS

1. Braided wire rope sling ... ?
2. Cable-laid sling ... ?
3. Conventional wire rope sling ... ?
4. Which of the many different terminals ... ?

- a. Build your sling for you
- b. Load-test it to twice its rated capacity
- c. Register it for its known strength
- d. Issue you a Certificate of Test and Registry for absolute safety.

ACCO-Registered Sling Service helps you select the right sling for your particular job—then registers and identifies it for known strength. All Hazard Slings are made of LAY-SET Preformed wire rope of Improved Plow Steel. Send today for your free copy of "A SLING SERVICE THAT GIVES YOU REGISTERED STRENGTH."



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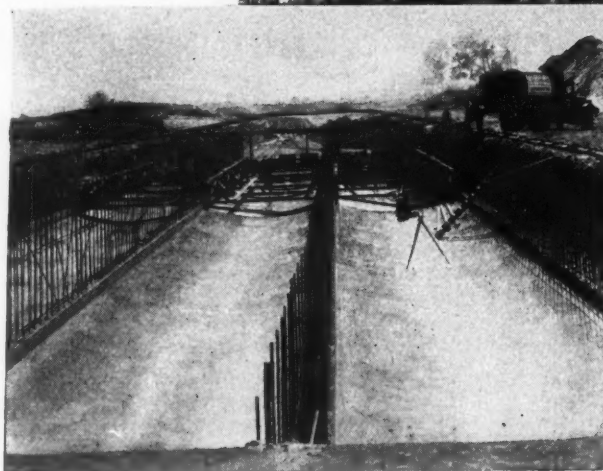
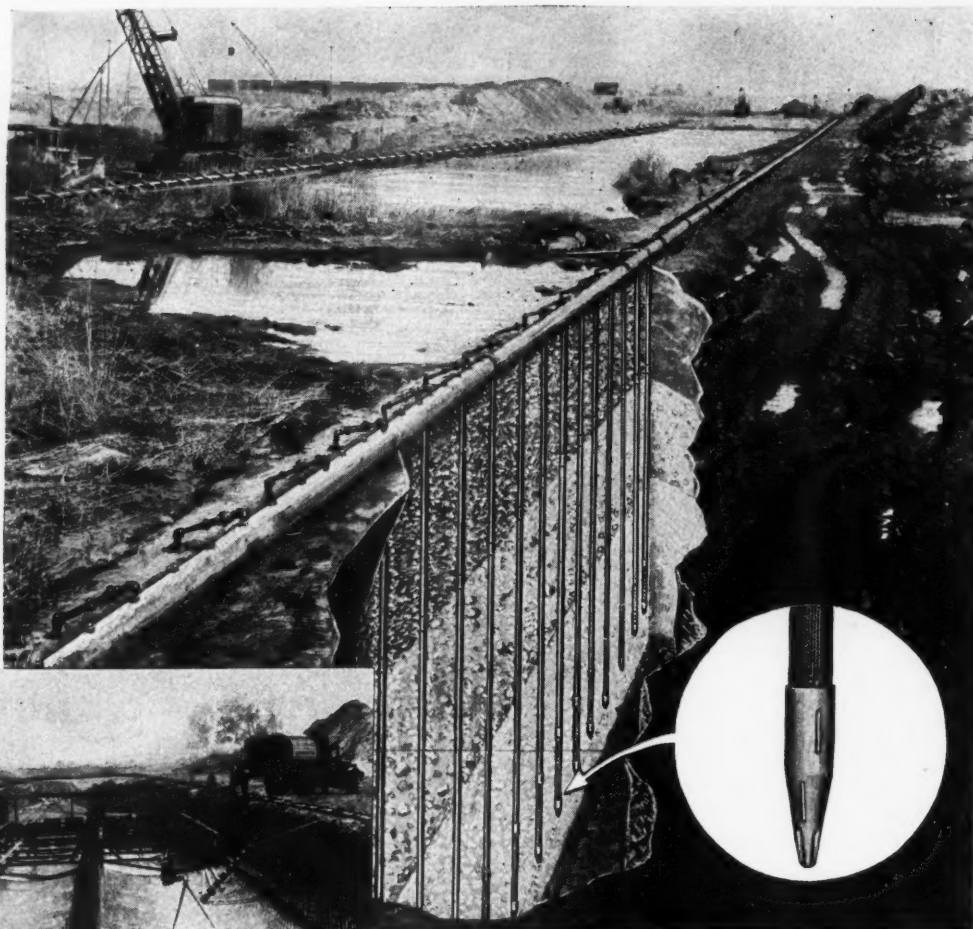
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Conn.

**HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE**



In Business for Your Safety

**Before
and
After**



Profit Insurance

Talk about your "before — and — after" photos! Here was the job of dewatering a waterlogged section 100 feet wide by 800 feet long, under water at high tide. Three Griffin Vac-U-Matic Pumps operating from ONE pump house, plus 300 Griffin Jet'n Wellpoints, did the work! Lower photo shows completed

sewer invert in foreground, concrete being poured in central section. Fuel costs on a similar job nearby were 10 times in excess of the Griffin Diesel-powered Wellpoint Pump. No matter what you want to build — if the job needs dewatering, Griffin will do it for you fast! This is Griffin Profit Insurance.

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America's Most Complete Line
of Material Handling Buckets

ALL PURPOSE

CLAMSHELL

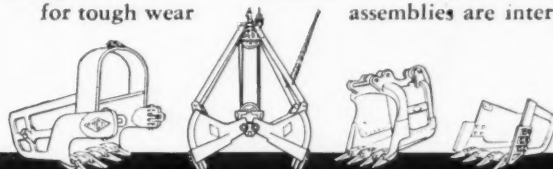
Sizes $\frac{3}{8}$ to 2 Yards

A TOP QUALITY BUCKET

Scoops throughout of cast 14% manganese steel developing up to 120,000 tensile p.s.i. for hard abuse. Scoops interchangeable—no rights and lefts.

TEETH—14% manganese steel—
for tough wear

BRACES—Stationary and movable brace
assemblies are interchangeable.



See your equipment dealer
about PMCo Buckets.

WE MAKE ALL FOUR BUCKETS

"Quality Since 1880"



PETTIBONE MULLIKEN CORP.

CHICAGO 51,
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WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.

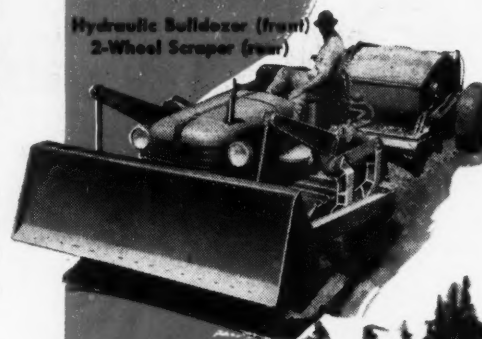
Here's teamwork FOR YOUR earth moving jobs

GAR WOOD ROAD MACHINERY WITH ALLIS-CHALMERS DIESEL POWER

The experience of successful contractors and public construction officials has shown that it takes teamwork to get earth moving jobs done on time and at lowest cost. When your operators and equipment work together with you as a team, you have a really unbeatable combination.

In organizing such a team, a logical place to start is with your equipment. Gar Wood Road Machinery and Allis-Chalmers Diesel Tractors are already "teamed up" for high efficiency operation because they are engineered and built to work as a team. And this dependable, proved equipment wins the enthusiastic cooperation of operators because it gets jobs done with the least effort and the utmost convenience and speed.

You benefit too by the nation-wide service of the strong Allis-Chalmers and Gar Wood factory organizations through your local dealer—always helpful service that keeps your equipment going. Get this teamwork on your jobs. Order Gar Wood Road Machinery now from your Allis-Chalmers dealer.



Hydraulic Bulldozer (front)
2-Wheel Scraper (rear)



Hydraulic Dozercaster



Cable Dozercaster

4-Wheel Cable Scraper



GW ROAD MACHINERY
is Sold Through
ALLIS-CHALMERS
Dealers Everywhere

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc.
DETROIT 11, MICHIGAN

OTHER PRODUCTS OF GAR WOOD INDUSTRIES INCLUDE HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS

**"GULF DIESELUBE H.D. keeps our engines clean,
helps us get better performance and lower
operating costs"**

*says the Contractor on this Airport project**



* Frank Mashuda Company, Mansfield, Ohio, recently completed the grading contract for the \$3,000,000 Mansfield Airport project, which required the removal of approximately 2,000,000 yards of dirt. Gulf Dieselube H.D. helped this Contractor keep equipment on the job and operating efficiently.

"**G**ULF DIESELUBE H.D. has done a great job for us," says Frank Mashuda, Contractor on the Mansfield, Ohio, Airport project. "This heavy-duty oil keeps our engines clean—provides the kind of lubrication for both our gasoline and Diesel equipment that means better performance and lower operating costs."

Use Gulf Dieselube H.D. in your equipment and see how it can help you cut down on repairs and overhauls. Take advantage of the extra value you are offered in these four points of superiority in Gulf Dieselube H.D.:

1. Detergent action helps keep motors cleaner.
2. Helps prevent ring sticking and minimizes cylinder wear.
3. Noncorrosive to alloy bearings.
4. Nonfoaming under all temperature conditions.

Gulf Dieselube H.D. is approved and recommended by leading manufacturers for both automotive-type Diesels and for gasoline engines

operating under heavy-duty conditions.

For further information on this modern heavy-duty oil, write, wire, or phone your nearest Gulf office today. If you have not yet received your copy of the new Gulf Diesel Lubrication Book, send the coupon below.



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Please send me, without obligation, a copy of the new Gulf book, "The Lubrication of Automotive Diesel Engines."

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Company _____

Title _____

Address _____



Fifty Years of Wire Rope

BACK in 1896, wire rope was not the highly specialized product it is today — neither was the equipment on which it was used.

The past 50 years have brought amazing developments in methods and equipment. Huge excavators take 35 cubic yards of earth at a 'bite.' Well drillers go down 15,000 feet into the bowels of the earth in their quest for oil. Huge logs are 'snaked' out of the tall timber like so many match sticks. Elevators supply vertical transpor-

tation in skyscrapers reaching up to the clouds. Man flies in aircraft around-the-world in less time than once required to go a few hundred miles.

Wire rope as a part of this equipment has also changed. Through the years Macwhyte Company has continually kept pace with equipment progress by specializing in the drawing of wire and the making of wire rope and wire rope slings.

We shall continue every effort to merit your wire rope and wire rope sling business.

MACWHYTE COMPANY

Specializing in the manufacture of wire and wire rope, wire rope slings, aircraft cable, assemblies, terminals, and tie rods.

2941 Fourteenth Avenue
Kenosha, Wisconsin, U. S. A.

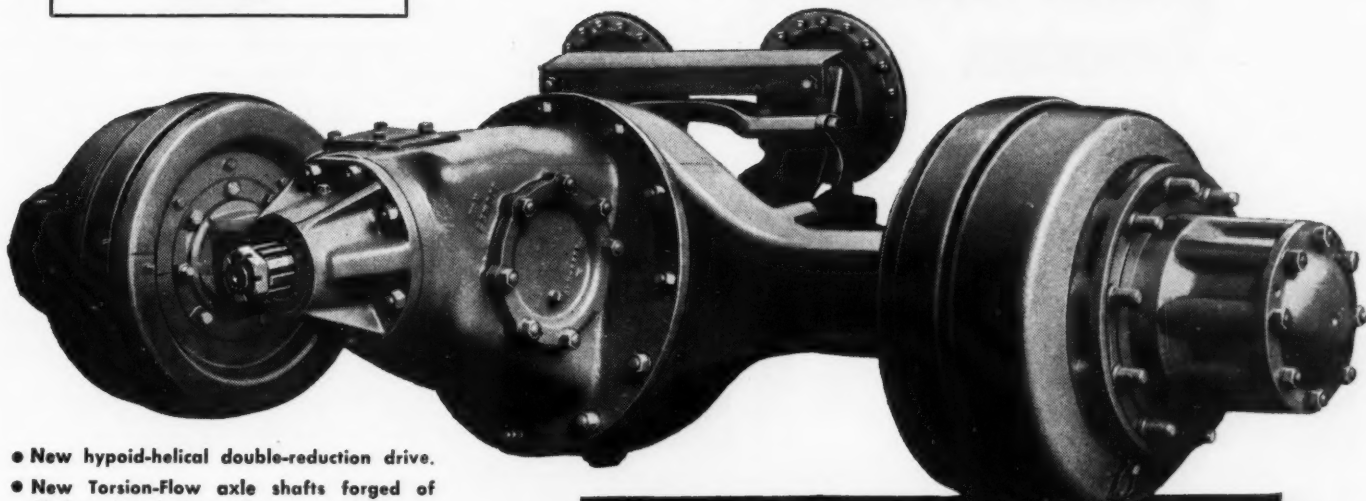


Mill Depots: New York • Pittsburgh • Chicago • Ft. Worth
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Distributors throughout the U. S. A. and other countries

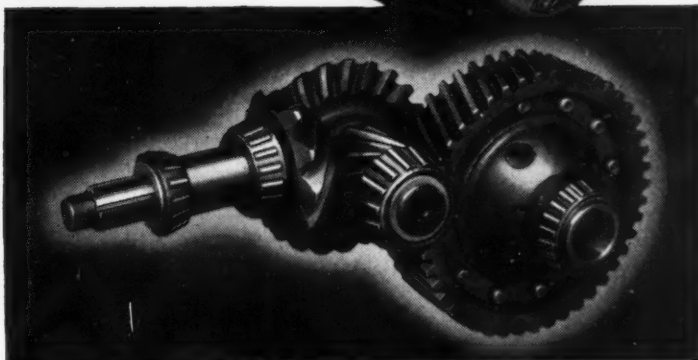
NEED GUTS TO GET THERE?

Postwar
Advanced-Related
Design

Specify New Timken S or U-200
Double-Reduction Heavy-Duty Axles
... AVAILABLE NOW!



- New hypoid-helical double-reduction drive.
- New Torsion-Flow axle shafts forged of Timken "Axaloy" steel.
- New interjacent pinion shaft location—nearly straight line propeller shaft drive.
- New heavy-duty DP Dual-Primary hydraulic brakes, or famous P Series power brakes.
- New rigid mountings for gears.
- New differential with 9-16 tooth combination.
- New transfer bar hook-up for P Series power brake-equipped axles. New protected location for brake chambers.
- Double-reduction final drive units and 2-Speed double-reduction final drive units are interchangeable in S and U Series axle housings without changing axle shafts.



Note: Large hypoid gears for first reduction, wide face helical gears for second.



TIMKEN AXLES

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT 32, MICH.

WISCONSIN AXLE DIVISION

OSHKOSH, WISCONSIN

NOTE: S-200 for use where permissible loads are over 18,000 pounds at the tires on the ground. Torque capacity is designed for modern high-power engines. U-200, for off-the-highway operation using the same engine torque, but where still greater load capacity is required. Data on ALUMINUM housing, brake shoes and hubs for weight saving available upon request.

Operators lucky enough to get the limited number of S and U-200 axles produced toward the end of the war will talk your arm off about the job they're doing.

"The best blankety-blank heavy-duty axles ever built!" they say—and stick their finger in your ribs when they say it!

These new double-reduction axles have scores of brand-new design and performance features. They have been proved by millions of miles of gruelling service. And they are in full production now—the only postwar heavy-duty axles immediately available!

If you want axles with the guts to get there—and keep on getting there indefinitely—specify TIMKEN S or U-200 axles under the next trucks you buy.

SPEED SHORING WORK

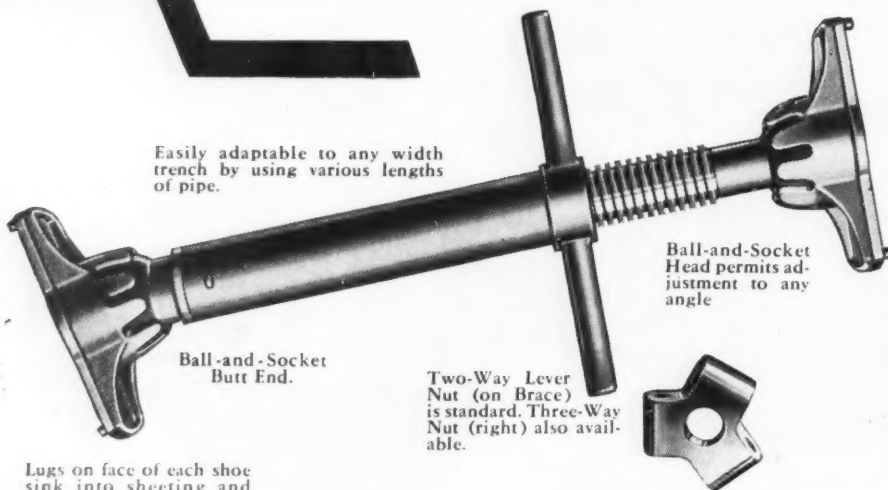
prevent cave-ins

with

DUFF-NORTON

EXTENSIBLE STEEL

TRENCH BRACES



Duff-Norton Extensible Steel Trench Braces are ideal for all your trench bracing work. Readily adjustable to any length, sturdy and safe, they hold firmly regardless of unevenness of trench. These Braces speed up shoring—prevent cave-ins—step up safety on construction projects.

Duff-Norton Trench Braces are available as complete units (as illustrated above), as separate fittings, for attachment to timbers. Write for descriptive literature.

**ADAPTABLE TO EVERY
TYPE OF BRACING
AND SHORING IN
WIDE OR NARROW
DEEP OR SHALLOW
TRENCHES OR EXCAVATIONS**



**THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH, PA.**

Canadian Plant
COATICOOK, QUE.

Representatives and
Jobbers Everywhere

(Continued from page 144)

type of construction a bituminous surface treatment. This surface treatment course consists of the application of approximately 0.6 gal. of semi-solid asphalt applied in two applications, covered with approximately 0.75 cu. ft. (loose material) of cover material per sq. yd. The two applications of asphalt are made at approximate rates of 0.25 gal. per sq. yd. for the first application and 0.35 gal. per sq. yd. for the second application. The cover material is applied in two applications, one of coarse and one of fine material. The proportion of coarse to fine material is approximately 2 parts of coarse for the first application to 1 part of fine for the second application. Florida Grade No. 11 stone (100% passing 1 in. sieve, 0-30% passing ½ in. sieve and 0-3% passing ⅜ in. sieve) is used for the first application. Florida Grade No. 15 (100% passing ¾ in. sieve, 90-100% passing ½ in. sieve, 0-10% passing No. 4 sieve, and 0-2% passing No. 10 sieve) is used for the second application.

It is noteworthy that after the
(Continued on page 158)



**GATKE Brake Blocks
and Frictions —**
Moulded to machined
accuracy in ALL
shapes and sizes —

GATKE MAKES
Brake Lining
Clutch Facings
Frictions
Non-Metallic
Bearings
Sheet Packing

FOR smooth, positive, non-grabbing action for Starting, Swinging, Hoisting and Stopping — you want GATKE High-Heat-Resisting Asbestos Brake Materials.

They are specially engineered and service-proved for all brakes and clutches of Excavating, Road Building and Construction Equipment.

GATKE CORPORATION

**226 N. LaSalle Street
Chicago 1, Illinois**

One Link-Belt Speeder

**DOES MANY
DIFFERENT
JOBS!**



Owners of Link-Belt Speeder machines enjoy year-round utility on many types of jobs, from the same rugged, powerful, easy-to-operate unit.

Quick Convertibility MAKES LINK-BELT SPEEDER THE MOST USEFUL MACHINE ON THE JOB!

Many a job begins and ends in the cab of a LINK-BELT SPEEDER, first fitted with shovel for excavating, or with dragline for clearing the site, then with boom and hook-block for placing concrete and erecting steel. Underground pipe lines are laid with the aid of the trench-hoe, and finally the grading and clean-up work finished off with the dragline again!

For Prompt, Efficient, Convenient Sales and Service:
There is a Link-Belt Speeder Distributor Located Near You

10,170

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO 9, ILL.
A DIVISION OF LINK-BELT COMPANY

COMPLETION DATES MAKE NO ALLOWANCES FOR CONVEYOR BELT FAILURES

Conveyor shutdowns mean idle men at the delivery end, construction stoppage, postponed completion dates. Where stone and aggregates are handled, operating conditions are tough on conveyor belts. Republic Conveyor Belts are designed by technologists who select materials and constructions for resistance to loading impact, and to abrasion and cutting. Republic workmen, with comparable experience in producing industrial rubber products, make sure that this engineering is built into each belt. For a conveyor belt that will give long, dependable service, consult your nearby Republic Distributor.



WE ARE
PARTICIPANTS IN THE
OWNERSHIP AND OPERATION
OF
NATIONAL SYNTHETIC RUBBER
CORPORATION



REPUBLIC RUBBER

DIVISION

LEE RUBBER & TIRE CORPORATION

YOUNGSTOWN 1, OHIO

REPUBLIC INDUSTRIAL PRODUCTS
YOUNGSTOWN, O.



LEE DELUXE TIRES AND TUBES
CONSHOHOCKEN, PA.

(Continued from page 156)

limerock is primed any type of bituminous surface can be satisfactorily applied.

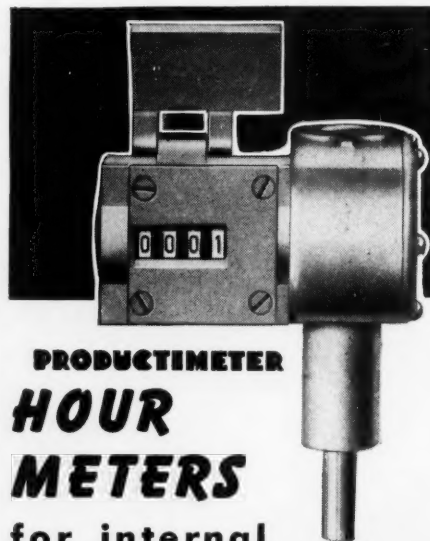
The average costs for the reconditioning of limerock roads as described are set forth herewith for 1 mile of road widened from 18 to 22 ft. The application of a bituminous surface treatment is included in the estimate:

Cost per Mile for Reconditioning Limerock Road Widened from 18 to 22 Ft.

QUANTITY	ITEM	UNIT PRICE	AMOUNT
12,907	Sq. Yd. reworking existing base	\$0.11	\$1,419.77
1,500	Cu. Yd. limerock (new material)	3.50	5,250.00
1,420	Gal. tar prime material	0.18	255.60
359	Cu. Yd. cover material	6.50	2,333.50
7,744	Gal. bituminous material	0.11	\$851.84
1.0	Miles, grading shoulders	200.00	200.00
	Average Cost per Mile		\$10,310.71

Because this type of construction modernizes old roads, will appreciably reduce maintenance costs, affords the traveling public better and wider roads, and assures a longer life of the original investment, a large part of the state's construction program during the coming years will be that of reconditioning of older roads. By this means the state is able to produce

(Continued on page 160)



PRODUCTIMETER HOUR METERS for internal combustion engines

register actual running hours of operation, just as a speedometer registers mileage. Specially applicable to gas or Diesel engines, Hour Meters provide valuable readings that enable owners and operators to maintain motorized construction equipment at highest efficiency. Use them on compressors, graders, mixers, tractors, bulldozers.

Compact, easily adaptable . . . send
for complete details in

Catalog No. 20

DURANT MFG. COMPANY

1980 N. Buffum St. Milwaukee 1, Wis.

AMERICA NEEDS ITS FASTEST TOOLS

Now!



...Tools like Barco Portable Hammers that have proved their efficiency and economy. Reports from every field of industry show owners' enthusiasm for the ready adaptability of this rugged, many-purpose tool. Barco Portable Gasoline Hammers are powered with air-cooled, two cycle, single cylinder engines. Put Barcos on your job for more speed. Don't hesitate to ask for full details.

BARCO

Portable Gasoline
HAMMERS



FREE ENTERPRISE—THE CORNER-
STONE OF AMERICAN PROSPERITY

Barco Manufacturing Company, Not Inc., 1812 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Can.

GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY 61 YEARS

For Greater Capacity

OUR IMPROVED HEAVY DUTY

JAW CRUSHER

*"Right for the
HARDEST ROCK"*

Operators of Crushing Plants on location of harder rock deposits, asked Gruendler Engineers for a Sturdier Jaw Crusher better able to withstand the terrific strain

on the toughest jobs, and still increase their ton per hour output

...Here it is...



"A Better Crusher to do a Better Job"

**Manufacturers of PRIMARY AND SECONDARY
HAMMERMILLS FOR LIMESTONE DISTRICTS**

WRITE FOR ILLUSTRATED BULLETIN B R 5, No. 2

GRUENDLER

CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

BROWNHOIST BUCKETS

Designed and built by Industrial

Brownhoist Corp. do a better job

because, 1) Large Sheaves re-

duce rope wear, 2) Heavy

Carbon - Steel digging

lips take deep, clean

bites, 3) Extra-sturdy

construction insures

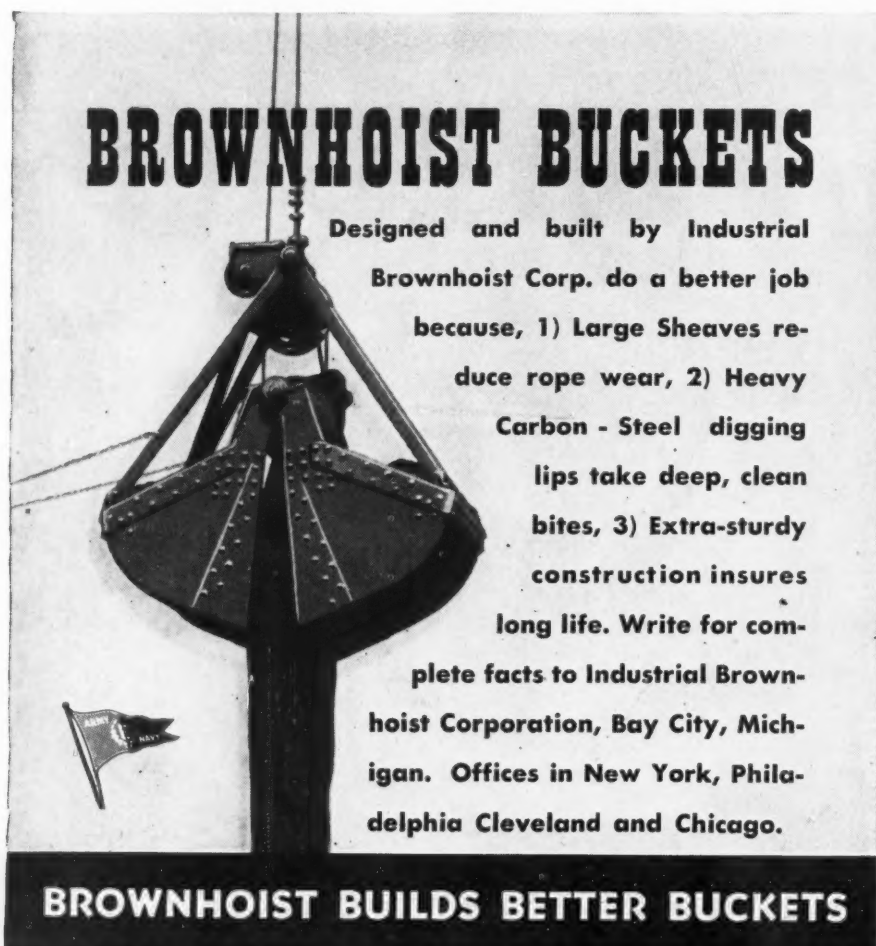
long life. Write for com-

plete facts to Industrial Brown-

hoist Corporation, Bay City, Mich-

igan. Offices in New York, Phila-

delphia Cleveland and Chicago.



BROWNHOIST BUILDS BETTER BUCKETS

(Continued from page 158)

a modern road meeting the requirements of width and thickness for an approximate unit cost of \$0.80 per sq. yd. A new limerock base, 8 in. thick, surface treated, costs approximately \$1.60 per sq. yd. These figures, therefore, indicate that a sound investment is made when the bulk of the existing pavement is salvaged and incorporated into the new base. For this reason we are endeavoring to use as much as possible the existing alignments which, in turn, means the salvaging of the original investment made by the counties and state some 20 years ago.

★ ★ ★

Air-Entrained Concrete

(Continued from page 85)

ing weight reduction on the job, the highway department engineers before starting paving operations ran full batches, made with normal portland cement, through the 27E mixer. Weighing this concrete, in the calibrated container, the weight per cu. ft. was determined to be 153.13 lb. As this concrete, made with normal portland cement, was known to contain an average of about 0.94 percent of entrained air, the absolute weight of the concrete without any air entrainment was computed to amount to about 154.7 lb. per cu. ft. This weight furnished the basis for measuring weight reduction, or air entrainment.

Paving Operations

Plastic, buttery consistency of the air-entrained concrete mixture had the usual effect during the October run on this job of eliminating segregation and laitance. The mixture spread and finished readily, and the finishers quickly learned to handle the plastic consistency. Lack of bleeding speeded finishing operations and cut down the overtime at the end of the day.

Hand finishing operations included straightedging and floating with long-handled implements, belting with two hand belts, and joint edging and finishing. When the concrete hardened, it was covered with heavy Sisalkraft paper for curing. The paper, which provided some

(Continued on page 164)

*This Building will have a
Highway on Every Floor!*



THIS IS A DRAWING of the "Interstate Commerce Center", to be erected in downtown Manhattan by the Tishman Realty and Construction Company. Thirteen stories high, covering four square blocks, *it will have a continuous 32-foot wide highway connecting every floor!*

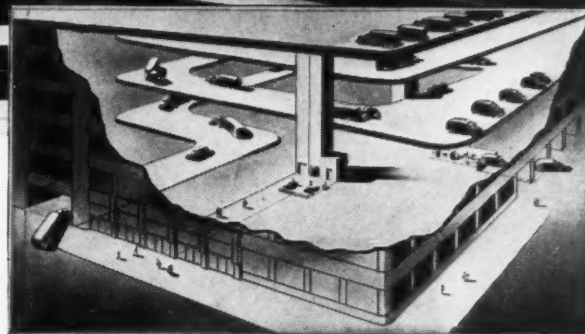
Here is *built-in transportation* in its most modern form—planned to take full advantage of the flexibility of motor transport.



Alert manufacturers, distributors, wholesalers, warehousemen and others who are intensively studying methods of making motor transport fit more closely into their busi-

nesses, will hail this type of planning.

Experience has proved that by gearing Trucks and Trailers with production and distribution, a business can be operated with greater efficiency and at much lower cost.



Architect's sketch of interior showing highway connecting each floor. A loading platform to accommodate 23 Trailers will be provided on every floor.

A Truck, pulling a Trailer, will go direct from the street to any floor, "drop" the Trailer at the loading platform on that floor, couple up to a loaded Trailer—and will be on the street again in a matter of minutes.

If you are altering or building, consult your Traffic Manager! He can help tremendously.

Your Architect, too, is alert to the importance of providing adequate facilities for motor transport—and should be on your planning committee.

These specialists, working together, are certain to improve the efficiency of your operation.

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY
DETROIT 32, MICHIGAN

Service in Principal Cities

Fruehauf Trailers



"Engineered Transportation"

When Pinched by High Production Costs

ATKINS

*...The Tools
for Cutting Costs*

SAWS OF EVERY TYPE FOR MACHINE AND HAND USE

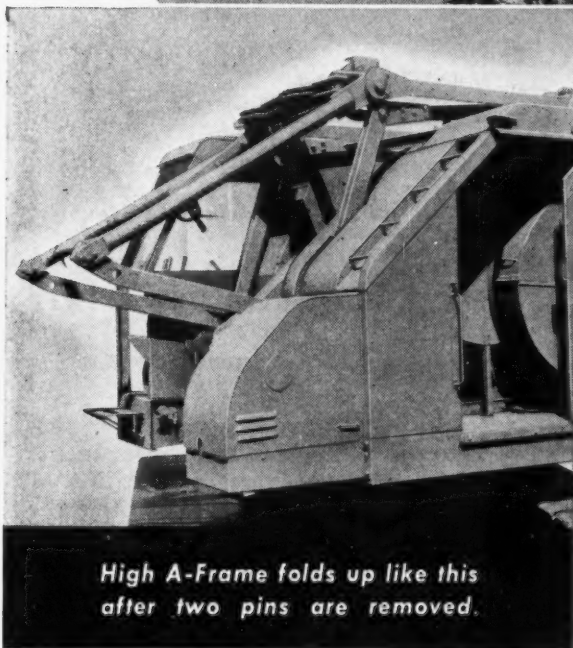
E. C. ATKINS AND COMPANY
485 South Illinois Street • Indianapolis 9, Indiana

AAA
ATKINS

KOEHRING

605

POWER RAISES
HIGH A-FRAME
FAST...



High A-Frame folds up like this after two pins are removed.

ASK FOR YOUR
605 CATALOG
TODAY!

Because power raises and lowers the High A-Frame fast, you cut moving expenses every time you ship the new Koehring 30-ton crane by rail, every time you truck it through a highway underpass, every time you move it under overhead obstructions on the job. In just a few minutes you reduce overhead clearance, from 18'-8" to 12'-9".

REMOVE 2 PINS, THAT'S ALL

Raising or lowering the 605 High A-Frame is simple, safe. Remove 2 pins and the High A-Frame is ready for lowering by power. A cable attached to the hoist-drum controls lowering speed. The same cable raises the 605 High A-Frame back into position. No danger of over-pulling because the High A-Frame comes to a definite stop when fully raised.

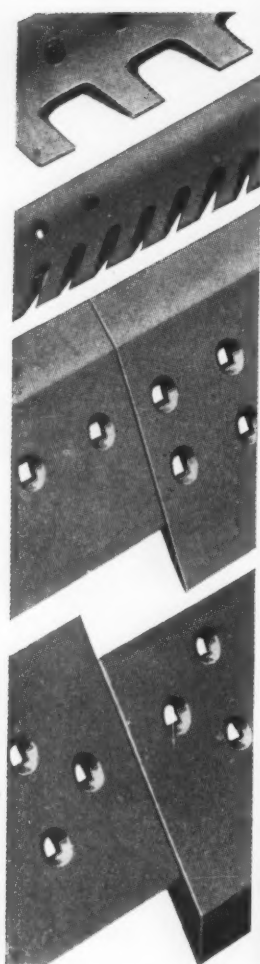
SUSPENSION CABLES STAY ON

Boom suspension cables stay in place on short moves. Because the frame is strong, the Koehring 605 crane may be operated with the High A-Frame in any lowered position.

KOEHRING COMPANY
MILWAUKEE 10, WISCONSIN



HEAVY-DUTY CONSTRUCTION EQUIPMENT



Shunk

GRADER AND SCARIFIER BLADES

For any type or make of machine—
Motor Graders, Maintainers, Scrapers,
Draga, Bulldozers, Backfillers, Wagon
Scrapers, Trail Builders, Trail Blazers,
Carrialls, Snow Plows, Also—
CUTTING EDGES, WEARING BOOTS,
BACK SLOPERS, EXTENSION BLADES,
MOLDBOARDS and
SCARIFIER TEETH

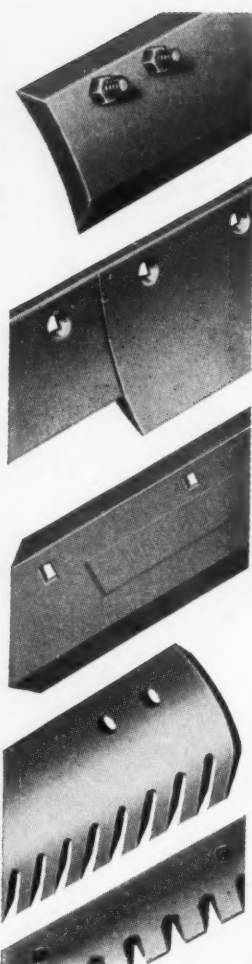
50 years of specializing in the manu-
facture of Construction Equipment
Blades has developed for your benefit
a quality of special steel, milled
through our own rolls and forged at the
edges to give that extra cutting and
wearing quality you need.

Furnished in various widths, lengths,
and thicknesses, punched ready to fit
your machine.

Consult your internationally recog-
nized Blade Specialists. Write for spe-
cial bulletins, giving type and name of
machines you operate—get set for
Blades early.

Shunk

MANUFACTURING
COMPANY
Established 1854
BUCYRUS, OHIO



(Continued from page 160)

frost protection, remained in place
about 3 days.

Average progress with the 27E
single-drum mixer was about 80
ft. per hr. The paving crew com-
pleted 9,100 lin. ft. before the job
closed down. On the best day, 409
batches were placed to build 881
lin. ft.

Direction

Operations of the North Dakota
Highway Department are adminis-
tered by N. O. Jones, commissioner.
Under M. P. Wynkoop, chief engin-
eer, construction projects are su-
pervised by F. H. Brasie, construc-
tion engineer. For the concrete
paving project here described, Hor-
ace H. Muller is resident engineer.

Contract for the job is held by
S. J. Groves & Sons, Minneapolis.
Construction is being carried out
by the Woodrich Construction Co.,
Minneapolis, operator for S. J.
Groves & Sons, with James Strain
as superintendent, assisted by W. F.
Woodrich.

★ ★ ★

Highlights

In Road-Building Picture

(Continued from page 82)

only in the sympathetic cooperation
of the state highway departments
and the governing authorities of
the cities and counties of their re-
spective States.

The \$500,000,000 federal fund for
the first year has been apportioned
among the states as the law pro-
vides, and the amounts thus made
available of each of the three frac-
tional funds are given in the accom-
panying table.

In most of the states the amounts
given in the table must be matched
equally with funds under state
highway department control.

Federal Fund Appropriations

The funds authorized by the fed-
eral government have not yet been
appropriated. Nor is there yet need
for appropriation. The Public Roads
Administration is authorized to re-
ceive and approve plans submitted
by the state highway departments,
and to approve contracts let by
them for construction, up to the

(Continued on page 166)



**REINFORCED HIGHWAYS CONTINUE TO SHOW
SUPERIORITY IN PERMANENCE AND LOW MAIN-
TENANCE. EVER-GROWING WHEEL LOADS REQUIRE
HIGHWAYS BUILT TO WITHSTAND INCREASED
STRESSES. STEEL REINFORCEMENT PROVIDES THE
ONLY INSURANCE FOR LONG AND USEFUL SERVICE
OF OUR NATION'S PAVEMENTS.**

Specify **LACLEDE'S PAVING STEELS**

LACLEDE STEEL COMPANY

ST. LOUIS, MISSOURI

They never say
"uncle"

... not these Gardner-Denver S-55 Sinkers that daily pile up records of greater footage! Every part that goes into them is rugged and precision built to assure long life and lowest service costs. Vibration is reduced—excessive wear is eliminated because of proper balance between the air power, striking power and rotative power. And the S-55 is exceptionally easy riding to reduce operator fatigue.

Fast and powerful, the Gardner-Denver S-55 speeds up even the toughest jobs. Its remarkable hole-cleaning ability clears the deepest holes of cuttings. Low power consumption and minimum maintenance cost make the S-55 the economy tool of the field.

For complete information and illustrated bulletin, write Gardner-Denver Company, Quincy, Illinois.

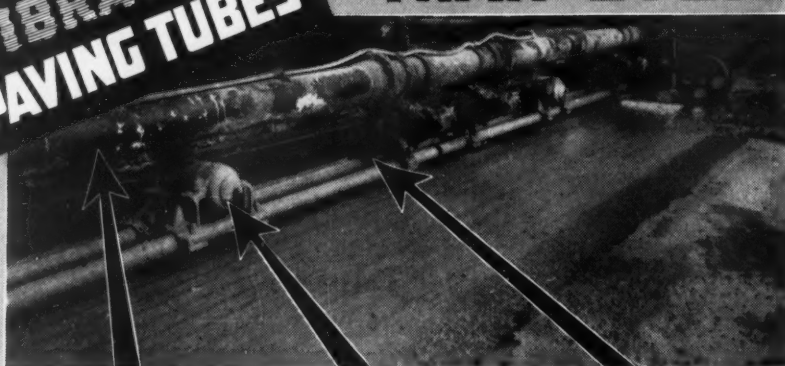


GARDNER-DENVER
Since 1859



JACKSON VIBRATORY PAVING TUBES

Now *Better* THAN EVER



Carriage frame from which the dual vibratory tubes are flexibly suspended, completely isolating all vibration from the finisher.

Powerful submersible vibratory motor rigidly attached to each set of dual vibratory tubes.

Dual vibratory tube members shown elevated above slab after first pass. In operation they are lowered well within slab. Depth adjustable as job conditions indicate.

IMPORTANT

NEW

IMPROVEMENTS

**QUICK
ADJUSTMENTS**
from 10' to 25' Widths
(in the field)

Simplified carriage frame makes changes from one width to another extremely quick, simple and easy.

**LOWER
SUBMERSION
HIGHER LIFTS**

Perfect adaptability to slabs 16" to 24" thick, without affecting the efficiency on single or two-course standard plain or reinforced concrete pavement construction, has been achieved by giving the vibratory elements lower submersibility and higher lift above the finished slab.

**DOUBLE
FUNCTIONING**

Horizontal full width submersible vibratory elements are standard as shown. As alternate or auxiliary equipment, however, we can furnish vertically mounted unit vibrators of the internal type in any spacing specified, thus making it possible for the contractor to meet all specifications with one machine.

Plus

**ALL THE ADVANTAGES THAT HAVE MADE THIS
PAVING TUBE AN OUTSTANDING FAVORITE**

- 1 Faster finisher progress in drier mixes.
- 2 Perfect puddling of concrete at forms and joints.
- 3 Complete compaction — excellent finish.
- 4 Reduction in spreading cost.
- 5 Instant transformation of stiff, dry mixes into plastic, easily placed concrete.
- 6 Dependable, proved performance. Finger-tip control.
- 7 Ample reserve power through entire variable frequency range of 3000 to 5000 VPM.

You're way ahead of the parade when you own a JACKSON! See your JACKSON distributor or write for complete information.

Manufactured by **ELECTRIC TAMPER & EQUIPMENT CO.** for
JACKSON VIBRATORS INC. Ludington, Mich.

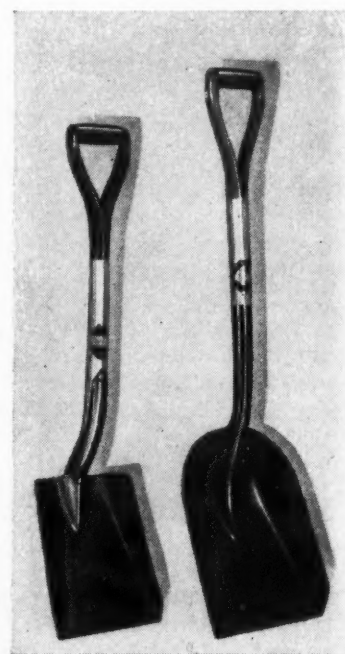
(Continued from page 164)

amount of each state's apportionment. Its approval constitutes a financial obligation of the federal government to pay its share of the cost involved. The state highway departments are required to meet initially the whole cost of work performed, and federal appropriation will be made as needed to reimburse them in the amount of the federal share.

The federal funds authorized for the second and third years will be apportioned in due course, and immediately upon their apportionment will become available for allotment to projects and payment in the manner previously described. On the part of the federal government, therefore, all necessary financial provision has been made for a \$3,000,000,000 program of construction, now set in motion, to continue over a period of four years or more.

It is by thus picking out and focusing first attention upon the highlights of all parts of the broad panorama of future road-building needs, as painted by the highway planning surveys, that the enlightened Fed-

(Continued on page 168)



**BLADE EDGES
GUARANTEED SPLIT-PROOF**

INGERSOLL SHOVELS
"The Borg-Warner Line"

Write for Catalog and Prices
**INGERSOLL STEEL DIVISION
BORG-WARNER CORPORATION**
New Castle, Indiana

Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.

In the construction of buildings, bridges, highways, airports and marine facilities

You're Right 3 Ways

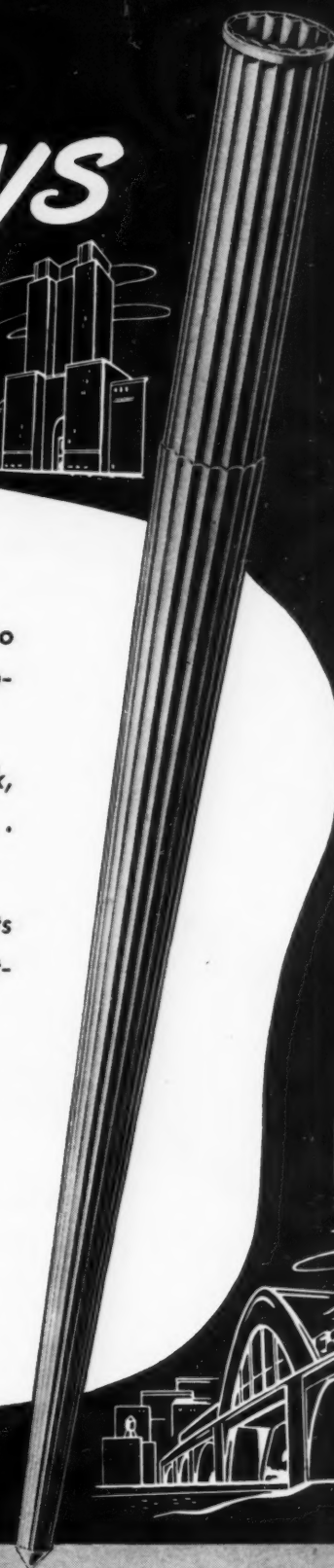
with MONOTUBES

1st—FLUTED, TAPERED design permits Monotubes to be driven quickly and easily with average job equipment . . . cutting your costs.

2nd—SPECIAL EXTENDIBLE FEATURE permits quick, simple extensions in the field, with minimum labor . . . minimizing waste.

3rd—HOLLOW TUBULAR CONSTRUCTION permits quick, thorough, full-length inspection prior to concreting . . . insuring permanence.

NO wonder *steel* MONOTUBE piles are such favorites with experienced engineers and contractors all over the country. Available in a gauge, size and taper to meet your specific requirements. Complete details, catalog, free on request to The Union Metal Manufacturing Company, Canton 5, Ohio.



UNION METAL

Monotube Tapered Piles

"SUBWAY"



Heavy Duty AIR HOSE

All-Synplastic construction. One of Goodall's oldest and best-known brands, with tube, carcass and cover especially made for heavy-duty service on all types of pneumatic tools. Sizes 1/2" to 1 1/4", inclusive.



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All Goodall products are made to specifications that assure an extra measure of service wherever they are used. Their quality and reliability are the result of 75 years devoted to furnishing better and better hose, belting, boots and clothing to American industry.

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Factory—Trenton, N. J.

Established 1870



(Continued from page 166)

eral-Aid Highway Act of 1944 will perform its signal service. Its financial provisions supply incentives to the cooperative action required of highway officials of the federal, state, and numerous county and city governments to convert to reality the more prominent features of the envisioned plan of an entire road and street system improved in balanced relation to functional needs.

In furtherance of this plan the Act requires the designation of two new highway groupings designed to point attention to the location of prominent existing deficiencies.

One it defines as a national system of interstate highways to consist of not more than 40,000 mi. of routes, joining by lines as direct as practicable the principal cities and industrial areas of the country, and making connections at our national borders with routes of continental importance in Canada and Mexico. It requires the selection of such a system by cooperative action of the several state highway departments and the Public Roads Administration.

The other it prescribes as a sys-

Continued on page (170)

National Carbide FLOODLIGHTS



FOR ALL
PURPOSES
FOR WHICH
FLOOD-
LIGHTS ARE
REQUIRED

Simple in Construction
Economical in Cost
Dependable in Operation

Available in 1500,
8,000 and 16,000
candlepower units.

National Carbide N-200
Light illustrated. Write
for literature showing
entire line of Flood-
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**BUCYRUS
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DOZER-SHOVEL

Your operator can always see what he's doing on a DOZER-SHOVEL. In shovel operations he can see the bucket as it enters the digging, watch it get a full load. He can see the ground over which he must move to reach his dumping position. He can see to spot the bucket exactly where he wants it for accurate dumping. In 'dozing, the operator can see just what he's doing. There are no frames, winches, hydrau-



lic cylinders or other obstructions to block the operator's full front vision on the DOZER-SHOVEL. That means faster, safer operating cycles day-in and day-out.

There are other features, too, which make the DOZER-SHOVEL unique. Combined with a TracTracTor it makes a balanced digging unit which retains all the inherent characteristics of the tractor. Ask your International TracTracTor distributor what that will mean to you. Ask him, too, about the DOZER-SHOVEL'S oscillating tracks, low clearance and other features offered by no other machine.

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 SOUTH MILWAUKEE, WISCONSIN

CONTRACTORS RUBBER PRODUCTS

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CONVEYOR, ELEVATOR and TRANSMISSION BELTING

all widths and plys

V-BELTS all sizes

HOSE all sizes

AIR	WATER	SUCTION	COMPRESSOR
FUEL	STEAM	WELDING	PILE DRIVERS
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and BOOTS, DREDGE SLEEVES, PUMP DIAPHRAGMS, ETC.

and everything rubber for Industrial Requirements

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Mercer End Dump Cart. Trailer type. Ideal for handling bulk. Acute pitching angle. Designed to dump free and clean. Various sizes. Furnished with steel or vulcanized-on type solid rubber tire wheels.

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... TOOL WAGONS
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—Special Handling
Equipment for the
Construction Industry

Trailer Trucks, Tractor Cranes,
Tool Wagons, Utility Carts . . .
Material Handling Equipment
of every type. Designed to your
requirements by experienced
engineers. Literature available.

Inquiries invited.

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MERCER ENGINEERING WORKS, Inc.

WORKS: CLIFTON (ALLWOOD) N. J.

Sole Representatives
MERCER-ROBINSON CO., Inc.
30 CHURCH ST.
NEW YORK 7, N. Y.

(Continued from page 168)

tem of principal secondary and feeder, or farm-to-market, roads, unlimited in extent, to be selected in each state by the state highway department in cooperation with local highway authorities and the Commissioner of Public Roads. Only roads of sufficient importance to find a place in these systems are to be eligible for improvement with the secondary-and-feeder-road funds authorized to be appropriated.

In ordering the designation of the interstate highway system the Act follows the recommendation made by the National Interregional Highway Committee appointed by President Roosevelt. The system now in process of designation in the manner prescribed, though somewhat larger than that recommended by the Committee in its report entitled *Interregional Highways*, will probably in other respects closely resemble the committee's proposal, shown in an accompanying illustration.

The Act does not earmark specific funds for the construction of this system when it is designated. It merely directs that all routes included in the new grouping, if not already covered in the federal-aid system (most of them doubtless will be) are to become parts of, and so eligible for improvement with funds provided for, that system. In view of this fact, the question has been asked: What purpose is served by designation of the interstate system? It is a reasonable question and it has a reasonable answer.

Federal-Aid System

The federal-aid system, though it includes in its 232,000 mi. generally the most heavily traveled roads of the country, contains within itself roads of a fairly wide range of importance. In its present state of improvement it is the product of 25 years of constructive effort, guided by standards that have been progressively lifted throughout that period in response to an increasingly exacting traffic demand. Substantial parts of it, built in the earlier years, measured now by recognized needs of the future, are found to be seriously deficient. Much, even of the more recent construction, limited in standard by the fund-spreading policy properly and consistently followed during the period of initial improvement, is not fully adequate to serve

(Continued on page 172)

Famous Tonic for any business
with light-hauling worries:

Rx **New Ford
Pickup Truck**



TWO GREAT FORD ENGINES

The 100 H.P. V-8 • The 90 H.P. Six
Three-Quarter-Floating Rear Axle

BODY DIMENSIONS: Length 78 $\frac{1}{2}$ inches • Width
49 inches • Height 20.22 inches • Loading
Height 23.73 inches • Load Space 45 cu. feet

New Ford Pickup Truck • Today's Ford Pickups are better trucks for *your* business. They're better trucks for *any* business. Exclusive Ford features and advancements make them roadworthy—streetworthy—farmworthy. Look below. You'll find advantages only Ford can offer—reasons why, year after year, registrations show "More Ford Trucks on the Road!"

MORE ECONOMICAL, MORE RELIABLE, MORE ENDURING THAN EVER!

TWO great engines—the rugged 100 H.P. V-8 with a score of important engineering advancements, or the 90 H.P. Six, for jobs that call for economical stop-and-go driving. Truck-type frame. Side-mounted springs. Three-quarter-floating rear axle with straddle-mounted pinion and 4-pinion differential. Four double-action shock absorbers. Note the generous dimensions of the heavy-gage steel Ford Pickup body, shown above—45 cubic feet of load space—wide enough for easy flat-loading of such 4-foot units as plywood or plasterboard (no wheel housings). Floor is heavy-gage steel-surfaced, with formed skid-strips and hardwood under-flooring. Tailgate, strong and rattle-free, swings full-down for loading.

Priorities No Longer Needed.



See Your Ford Dealer!

FORD TRUCKS



Manganese Steel Found a Part in the Timely Production of the Atomic Bomb

Timeliness will always loom prominently in the history of the atomic bomb. Had this war-terminating weapon been available a year sooner, our casualties in the European theatre would have been much less. As it was, our losses in the Pacific were greatly reduced by its opportune advent. It is almost needless to state that American science and industry made every effort to have the atomic bomb ready for use at the very earliest date possible.

The rapid preparation of plant sites and the construction of access highways by the most advanced equipment, helped to speed the production of the atomic bomb.


✦ Pictured above is a moment in the construction of a 23-mile stretch of access highway between Knoxville and the atomic bomb plant at Oak Ridge, Tennessee. A Link-Belt Speeder Series 300 shovel is loading a bottom dump Euclid. A 2 yd. Amsco Manganese Steel Renewable Lip Dipper is discharging its load.

Continuous operation was highly important on every phase of this project. Dippers that required time out for repairs could have seriously delayed what was then a vital link in the war effort.


Amsco dippers insure the greatest obtainable freedom from operating delays, as well as the longest wearing life, by the use of tough, work-hardening manganese steel throughout. Repeated impacts that would cause ordinary steel to fail serve only to surface-harden austenitic manganese steel, giving it incomparable resistance to abrasive wear. Amsco design contributes fast, full loading and clean dumping. With Amsco Renewable Lip Dippers, it is not necessary to scrap the entire front when the lip has become worn. Lips are quickly changed.

Send for Bulletin 641-D on Amsco Dippers.

How Amsco Conservation Welding Products Keep Construction Equipment on the Go is told in Bulletin 941-W.



Foundries at
 Chicago Heights, Ill.; New Castle, Del.;
 Denver, Colo.; Oakland, Calif.;
 Los Angeles, Calif.; St. Louis, Mo.
 Offices in Principal Cities
AMERICAN MANGANESE STEEL DIVISION
 CHICAGO HEIGHTS • ILLINOIS



(Continued from page 170)

efficiently present and foreseeable traffic demands.


We stand now at the point where—the system improved in varying degrees of adequacy by 25 past years of pioneer effort—it is the job of the future to lift the standard throughout to a level consistent with the more clearly discernible ultimate traffic requirements. In so doing it will be logical to center attention first upon the modernization of those parts of the system that serve the heaviest and most important streams of traffic.

The planning surveys have shown conclusively that the principal cities are the sources and objectives of far the greater part of arterial highway traffic. It follows that a relatively small mileage of routes directly connecting the largest cities of the country should serve a large fraction of the nation's traffic. The Interregional Highway Committee found that its system of 34,000 mi., though it contained only 1 percent of the total of road and street mileage, would serve, if fully improved, about 20 percent of all highway

(Continued on page 174)

EMBURY
Luck-E-Lite
HIGHWAY TORCHES

*The Dependable
 Watchman!*



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EMBURY MFG. CO., WARSAW, N. Y.

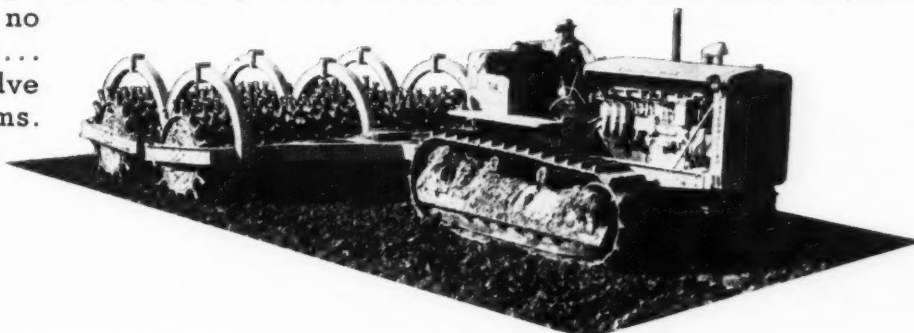
Southwest *Compaction Units*



**100-TON
CAPACITY**

Southwest's leadership in the development of new Construction Machinery designs has greatly influenced modern methods of compaction... This giant unit, specially designed and manufactured by Southwest is seen at work on the construction of Clover Field, where it broke records for compaction efficiency. The 100-ton load is equally distributed over the huge tires which track in staggered formation... Southwest's wide experience in designing special Sheepsfoot Tamping Rollers and Compaction Units can be put to work for you too. Whatever the job specifications... no matter what the conditions... Southwest can help you solve your compaction problems. Write for latest bulletins.

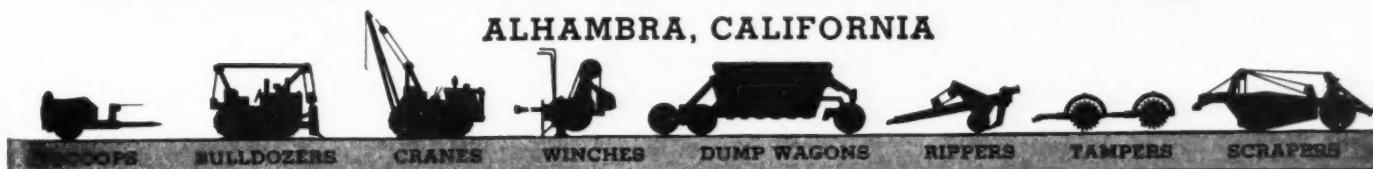
This special, 6-drum Southwest Sheepsfoot Tamper is shown on the construction of Prado Dam in Southern California.



CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

ALHAMBRA, CALIFORNIA





The
Ottawa
REG. U. S. PAT. OFF.
INDUSTRIAL
HYDRAULIC
FRONT END
LOADER
PAT. NO. 2,170,000 OTHER PATS. PEND.

Lifts 3,000 Pound Load 8 Feet

The "Ottawa" INDUSTRIAL Hydraulic Front-End LOADER is a HEAVY DUTY Machine . . . it lifts 3000 pounds of Sand, Gravel, Rock, Coal, Steel Pipe, Dirt or Other Bulk Materials to a height of 8 feet quickly and easily . . . it assures operator perfectly CLEAR VISION at all times, is quickly and simply ATTACHED or DETACHED and is SHIPPED COMPLETE (there's absolutely nothing additional to buy or add) with complete HYDRAULIC SYSTEM including pump and valve. Bulldozer blade, Snowplow and Boom attachments are available. Write or wire today for FREE ILLUSTRATED FOLDER and prices. Immediate shipment.

Available for
INTERNATIONAL
Models I-4 and I-6
ALLIS-CHALMERS
"WC" with wide front wheels
OLIVER
"70" Industrial
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"RTI" and "UTI"

Ottawa STEEL PRODUCTS, Inc.
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FULL HP TEST RUN

*Double-Checks
Power Output of All*

WISCONSIN Air-Cooled Engines

Every 4-cylinder V-type Wisconsin Engine, as well as all single cylinder engines from the smallest to the largest, are put on a 4-hour test run (the last hour under full load), working against a specially designed water brake.

This not only serves as an operating check on power output, but also provides a valuable functional pre-test of every working part . . . because no engine is any better than its smallest individual part, nor all of the parts working together in perfect mechanical coordination.

All this is important in relation to the work these engines may be called upon to do when powering your equipment.

Most
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pound



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MILWAUKEE 14, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

(Continued from page 172)

traffic. The somewhat larger interstate system now being officially designated should serve close to one-fourth of the highway traffic of the country.

The purpose of the designation is to bring about a general recognition of these roads as highways of great importance and promote their fully adequate improvement as a system by collective action of the highway authorities of all states and cities through which they pass.

The Interregional Highway Committee recommended in minute detail the high standards to which, in the committee's opinion, the future construction of such important highways should conform. The Interregional Highway Committee's recommendations have been reviewed by the Committee on Planning and Design Policies of the American Association of State Highway Officials, and the slightly modified standards proposed by the latter committee have lately been adapted by the Association as its recommendation of the minimum standards that should prevail in construction of the interstate system.

Secondary and Feeder Roads

The provision of the Federal Act requiring designation of a system of principal secondary and feeder roads has met with similarly gratifying response in nearly all states. State highway departments and county officials are generally co-operating cordially in the selection of roads to comprise the system. As previously stated, the new federal funds are available for expenditure only on roads included in the designated systems. The purpose is to select systems of such size as to be capable of improvement in a reasonable period of years and subsequently maintained with the Federal and other funds likely to be available for expenditure on the included roads. The systems will embrace the principal tributaries to the primary federal-aid system, and though, in roads of this class, the potentiality of economic and social benefit to rural communities is of more significance in the selection than the volume of traffic presently served, it is probable that the roads selected when improved jointly with the primary system will extend the benefits of adequate service to a very large fraction—possibly 75 or 80 percent—of all rural highway transportation.

Advisory standards, consistent
(Continued on page 176)

Build the Road Better



with Bethlehem Steels

You can build a concrete highway better by using Bethlehem's complete line of road steel products—because they're rugged, efficient, economical. And because there are real dollar-and-sense advantages in buying all your steel needs from one reliable source.

Bethlehem can give you co-ordinated service all along the line—from the time the Bethlehem hollow drill starts the job moving, until the last guard rail is set in place. By taking advantage of this service, you'll get your order under way fast, simply by contacting a Bethlehem representative—and you'll save yourself time, trouble and extra bookkeeping. Shipments will be scheduled to reach the job as needed, so that you'll avoid delays and idle equipment and men.

Get in touch with the nearest Bethlehem district office—or write to Bethlehem Steel Company, Bethlehem, Pa.—for full information about Bethlehem road steel products and service. No obligation, of course.

BETHLEHEM PRODUCTS FOR HIGHWAYS

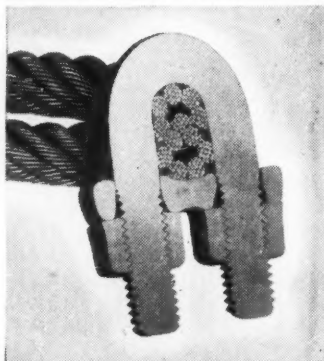
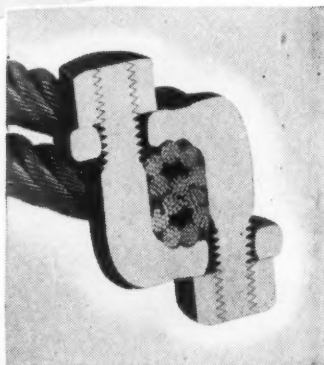
Road Joints • Center Strip • Dowels
Dowel Bar Supports • Reinforcing Bars
Bar Mats • Bar Ties • Reinforcing for Concrete
Pipe • Bridge Floor Reinforcing
Concrete Slab Spacers • Welded Wire Fabric
Guard Rails • Guard Posts and Brackets
Wire Rope and Strand • Right-of-Way
Fence and Posts • Anchor Rods • Pipe
Hollow Drill Steel • Digging Bars • Structural
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Sheets • Turnbuckles • Tie Rods, Spikes,
Bolts and Nuts • Timber Bridge Hardware
Sheet and H-Bearing Piling



TREAT YOUR PREFORMED WIRE *Right*

RIGHT AND WRONG WAY TO HOLD WIRE ROPE

Examine these cross-section views of a "Fist-Grip" Safety Clip and "Finger-Pinch" U-bolt. (Each tightened to exactly the same tension with a torque-indicating wrench). Notice how the "Fist-Grip" clip holds the rope evenly with only the slightest flattening . . . how the U-bolt crushes the rope out of shape as evidenced by the distorted hemp center under the "U".

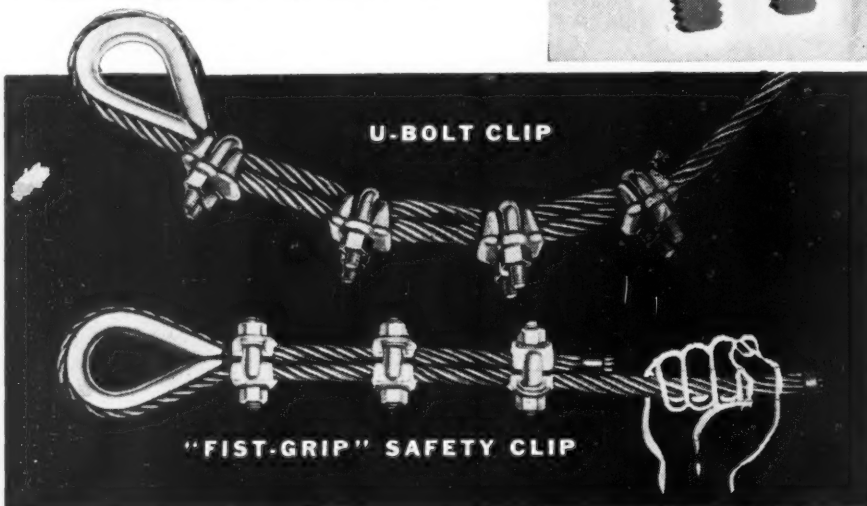


"PREFORMED" ROPE DESERVES "FIST-GRIP" CARE

When you pay extra for the advantages of "Pre-formed" rope, protect your investment by using Laughlin Safety Clips that keep ropes straight and strong. Get these other features too . . . the only clips with drop-forged bolts — 3 do the work of 4 U-bolts — they can't be put on backwards.

If you haven't tried "Fist-Grip" Clips . . . purchase a few to test. See how much faster they can be installed . . . how much better they work . . . how much you save in clips, time and money.

Distributed through mill, mine and oil field supply houses. Send for Laughlin's catalog of wire rope and chain hardware. Address Dept 1, The Thomas Laughlin Co., Portland 6, Maine.



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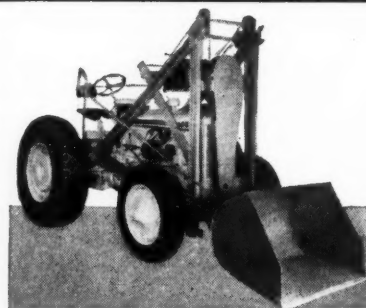


(Continued from page 174)

with the generally lesser traffic requirements of roads of this class, have been recently adopted by the American Association of State Highway Officials, and a systematic process of improvement is now beginning which, faithfully continued for a number of years, should yield results as gratifying as those that have issued from the similar process applied in the improvement of the federal-aid and state highway systems.

Much has been done during the war period of enforced construction deferral to prepare for the prompt launching of a vast program of highway modernization. The state highway departments alone report plans completed for nearly \$700,000,000, and in process for another \$2,500,000,000 worth of work. The highway planning surveys have painted a broad picture of the integrated, harmoniously improved street and highway system that the future should achieve. Similar studies are continuing to guide the development in detail, as witness particularly the elaborate traffic

(Continued on page 178)



FRONT END LOADERS

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1/2 and 5/8 cu. yd. Capacity

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P. M. ULSCH HEALTH-SANITATION
EARLE E. JONES SECRETARY

City Commission of the City of Jacksonville
940 MAIN STREET
JACKSONVILLE 2, FLORIDA
June 29, 1945.

E. SHEDDAN CITY ENGINEER
E. P. ... CITY AUDITOR
G. M. GORDON PURCHASING AGENT
AUSTIN MILLER CITY ATTORNEY
GOV HUTCHINSON CITY SOLICITOR

Florida Equipment Company of Jacksonville
10 Stockton Street
Jacksonville, Florida

Gentlemen:

For many years the City of Jacksonville has been using patrol graders for their mixed in place bituminous pavement and also for their shell or lime rock stabilized pavement. The reason for stabilizing with shell and lime rock is owing to the deep and heavy sand streets in certain sections of the city. In dry weather these sand streets are practically impassable, especially at intersections. Using a patrol grader with scarifier teeth is slow and costly work.

In using a patrol grader for mixed in place bituminous pavement, the asphalt has a tendency to roll or ball and quite a bit of it is lost. It is rather hard to control the asphalt contents of the pavement and owing to this fact some parts of the pavement are very rich and others lean. In some types of sand it has a tendency to streak, making it necessary to go back and out out patches and replace with plant-mixed asphalt.

Since we have been using the Seaman Pulvi Mixer Model MHD-72 with "B" rotor, we have been able to get a more uniform job and have had no streaking or had to out out any patches, and in addition to that, we have been able to save about one-third on our asphalt and cut the time about seventy-five per cent. Therefore, it is a much better mixed in place bituminous pavement. In our shell sand stabilizing pavement, we have been able to get a better and more uniform mix of sand and shell and have saved better than seventy-five per cent on our time. As anyone knows, the time factor in a construction job is one of the main objects, especially since the man power shortage is very acute in this city.

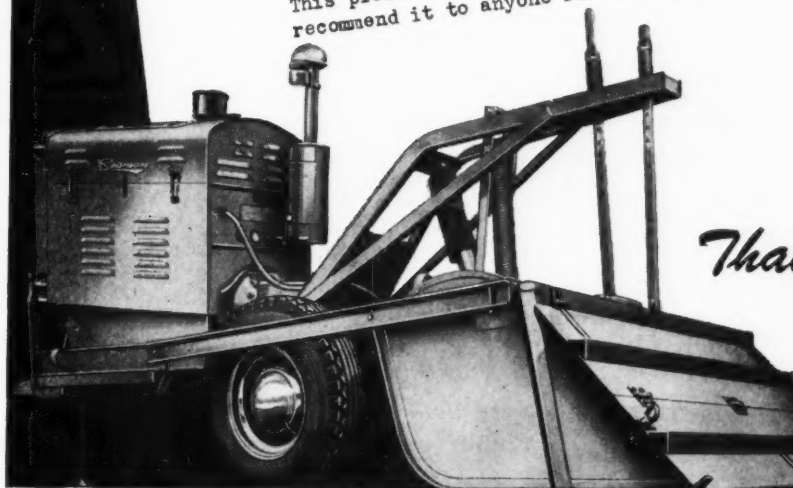
This piece of equipment is ideal for our type of work and we do not hesitate to recommend it to anyone for use on this type of construction.

Yours very truly,

CITY OF JACKSONVILLE
HIGHWAY DEPARTMENT

By: *W. T. Brown*
W. T. Brown
Maintenance Engineer

Thank You
MR. BROWN



NO WORDS OF OURS COULD
ADD TO THE IMPORTANCE
OF YOUR MESSAGE.

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METHODS

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The **VIBRATORS**
workmen like to use



PERFECT BALANCE makes Viber Vibrators so easy to handle that better workmanship results—and faster work schedules may be maintained. **VIBERS** give you a constant, smooth speed of **9,500 RPMs IN CONCRETE**—the highest ever offered. Vibers are flexible, yet rugged, and all elements are interchangeable, including electric, pneumatic and gasoline motors.

THE VIBER COMPANY
726 So. Flower St., Burbank, Calif.



(Continued from page 176)

origin-and-destination surveys going forward in many cities as basis for the location and construction of new expressways. The recent Federal Act has focused attention upon the highlights of the planned road-building picture, and supplied in substantial amount financial aid toward a vigorous beginning of the work that will translate the picture into reality.

The auspices are favorable to an excellent start and a strong continuance of well-planned modern road construction.

★ ★ ★

Ohio Pavements

(Continued from page 114)

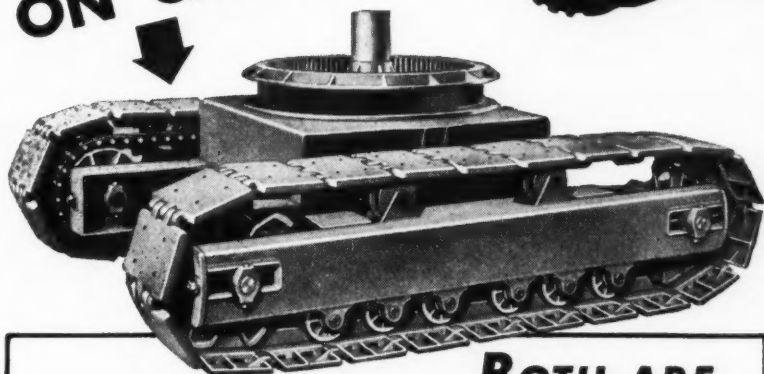
tensive reconstruction may be made, if that is necessary due to alignment or sight distances. Both widening and resurfacing may be done with any of the various meth-

(Continued on page 180)

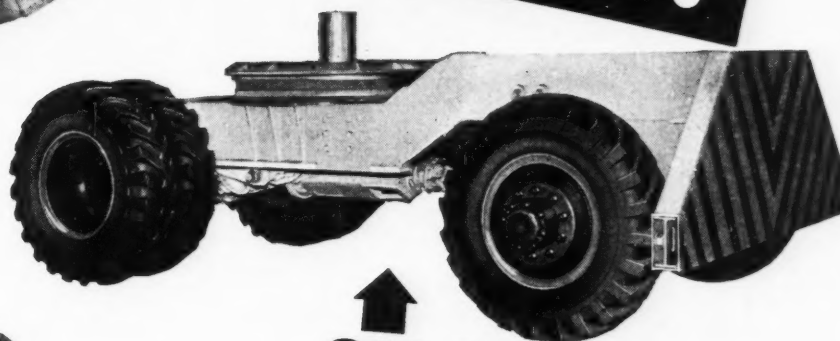
OUR NEW HALF-YARD SHOVEL . . .

HOW DO YOU WANT IT?

ON CRAWLERS



ON RUBBER



**BOTH ARE
"TESTED • PROVED • APPROVED"**

HERE'S an excavator that is offered two ways . . . on sturdy self-cleaning crawlers, or on a specially engineered, short coupled rubber tired chassis that makes the excavator highly mobile and self propelled.

EITHER WAY IT IS A ONE MAN OPERATED MACHINE

With either type of lower base, the revolving deck and all attachments are alike, embodying the same basic design and economy features . . . the same rugged revolving frame, enclosed gears, cool air clutches, air brakes, finger tip controls, safety boom hoist, wide tandem drums, fast line speeds and ample power.

For rubber tired mounting, a steering wheel is located in the cab at the operator's position, a gear shift and selective transmission for high speed road travel are added, together with foot accelerator and travel brake pedals.

You can order your new Byers excavator either way you want it, depending on your own operating conditions . . . Byers Traveler, on rubber, or Byers Model 61, on crawlers.

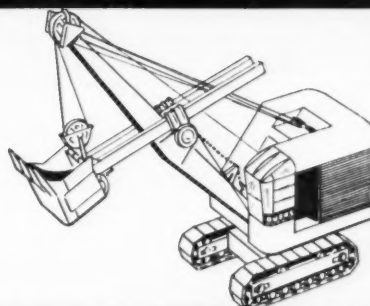
For full information and complete illustrated catalogs, see your nearest Byers equipment distributor.

THE BYERS MACHINE CO.

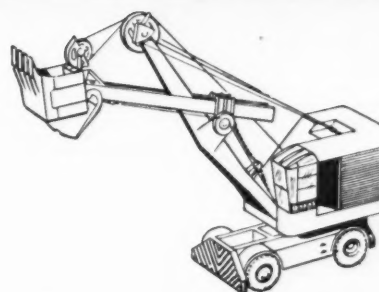
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BYERS MODEL 61



BYERS TRAVELER



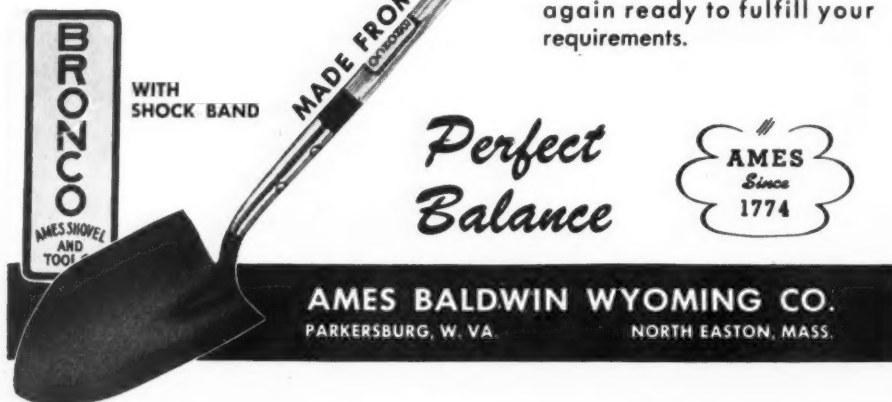
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SHOVELS AND CRANES
ON CRAWLER OR ON
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MODEL 61 TRAVELER

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For more than two years the entire production of our Solid Shank Shovels and Spades was assigned to the fighting ranks.



Bronco, the King of all Standard Weight shovels and the toughest of Solid Shanks, is again ready to fulfill your requirements.

Perfect Balance



AMES BALDWIN WYOMING CO.
PARKERSBURG, W. VA. NORTH EASTON, MASS.

(Continued from page 178)

ods and materials commonly used in pavement construction.

Bituminous concrete has been used on an increasingly extensive basis in recent years in our widening and resurfacing work. This discussion, therefore, is limited essentially to bituminous concrete, along with other materials which are used as a sub-base for that material. This type of construction has a number of advantages which have been responsible for its wide use. The principal advantages are: (1) It is not necessary to close the road to traffic; (2) The new pavement is ready for use soon after the compaction is completed; (3) Bituminous concrete may be adapted to use with any type of existing pavement for both surfacing and widening; (4) It is possible to complete an extensive mileage during an ordinary construction season, and (5) Improved methods of laying make it possible to obtain a good riding surface.

Correcting Base Failures

In making pavement improvements it has been the practice to provide for correction of base failures due to subgrade conditions which may not be strengthened sufficiently by the resurfacing alone. Normally this is done by removing the defective areas and excavating 12 to 18 in. of the subgrade material and replacing it with a properly drained classified embankment. It has been determined by experience that it is generally more economical and satisfactory to correct for a minor breakage of the old pavement by increasing the thickness of the resurfacing material over these areas. In operating in this manner where traffic is maintained, it is necessary to place sufficient thickness of material in the initial operation to make sure that the original breakage will not be carried through the resurfacing courses.

Pavement Widening

Many of our recent resurfacing projects have included widening. The widening may vary with each project, but it generally consists of widening 16-, 18- and 20-ft. pavements to 22- or 24-ft. widths. If the widening to be done is 2 ft. in width, it probably is confined to one side. It may also be confined to one side for greater widths depending on existing shoulders and structures.

Originally, our bituminous con-

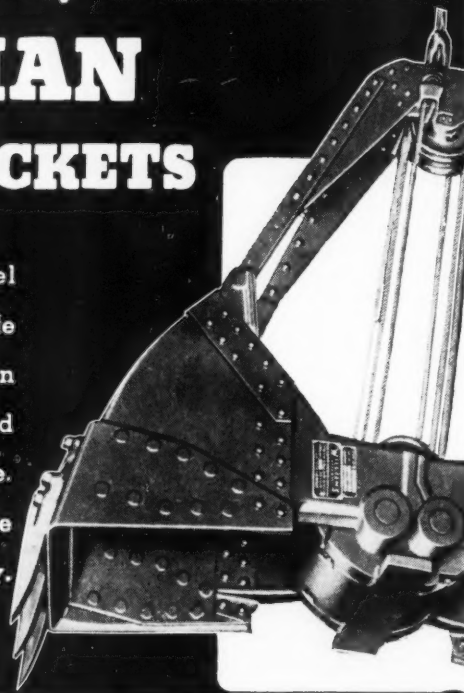
(Continued on page 182)

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WELLMAN *Williams* BUCKETS

Welded Rolled Steel construction builds longer life and greater utility into Wellman buckets. Multiple Rope and Power Arm types. Dragline. Power Wheel. Special Service Buckets. $\frac{3}{8}$ to 16½ yd. capacity.

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WHEN THE WAR made it vital for operators to keep every piece of automotive equipment on the job, Standard Oil produced a Streamlined Preventive Maintenance Plan that was simple to install and follow, and utilized unskilled labor to a great degree. Many fleets took advantage of this plan and saved scarce parts, equipment and many hours of labor.

Even though there is new equipment in the offing and the shortages of parts and labor are easing up, there will always

be a need for Streamlined P. M. in your fleet operation.

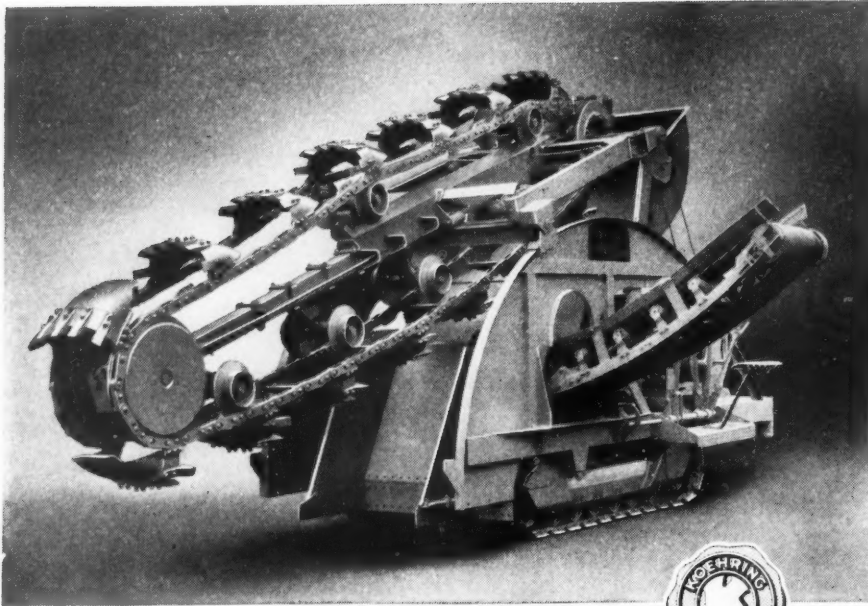
It will reduce breakdowns on the road, lengthen the life of new or old equipment, and reduce the time your trucks spend in the shop for maintenance.

A Standard Automotive Engineer will gladly show you how simple this plan is and help you get started on "Streamlined" Maintenance savings. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

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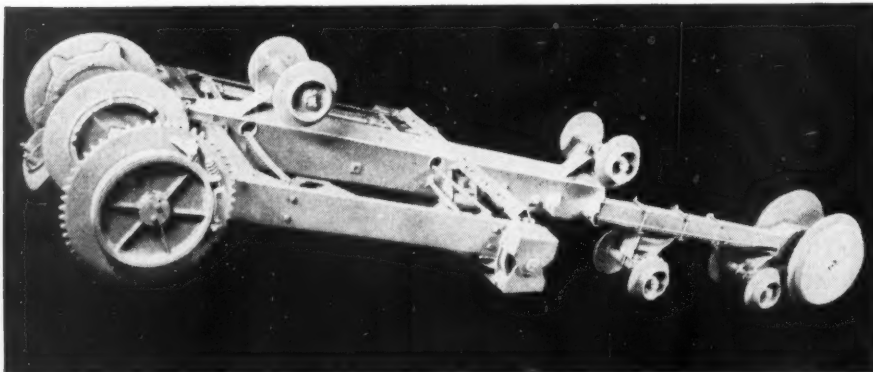
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221 PARSONS TRENCHLINER

STRONG TELESCOPING BOOM LOCKS SECURELY

Boom locks securely at points of adjustment, simplifies major trench depth adjustments on the new Parsons 221 Trenchliner. Adjustments of 1 foot or more up to the 8 foot maximum digging depth of the 221 Trenchliner, are easily made. Only 4 bolts are involved in any change.



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KOEHRING SUBSIDIARY NEWTON, IOWA

TRENCHING EQUIPMENT



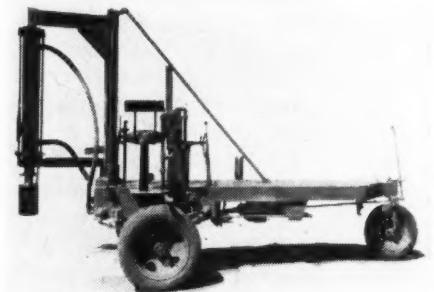
(Continued from page 180)

crete widening required the use of steel side forms to allow for (1) a 1 1/4-in. insulation course of granulated slag, slag or limestone screenings; (2) two 3-in. bituminous concrete base courses and (3) a 2-in. leveling and wearing course. The use of such forms required extensive bracing to prevent displacement. Our more recent construction practice, which has been used almost exclusively during the 1945 construction season, is to build the widening without the use of side forms. Each successive base course is stepped in 3 in. in this type of construction.

Excavation for widening has been performed by various methods. One which has proved very satisfactory is the use of a trenching machine mounted on a truck chassis built especially for the purpose. This method provides accurate control of grade and results in a uniform edge with a perfect supporting shoulder which is especially desirable where side forms are not required.

No matter what method is used, the problem of excavating for the widening is simplified to a great

(Continued on page 184)



Junior RAPID PAVEMENT CONCRETE BREAKER

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Cuts Cost and Time
Works Inside or Out
Vertical or Horizontal
Good for all Small Jobs

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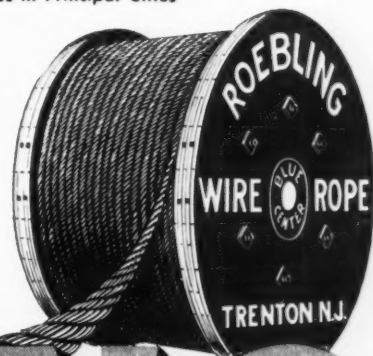
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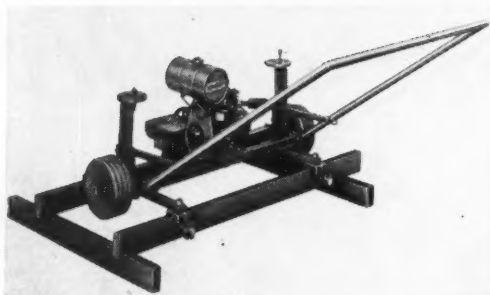
Whiteman

CONCRETE EQUIPMENT

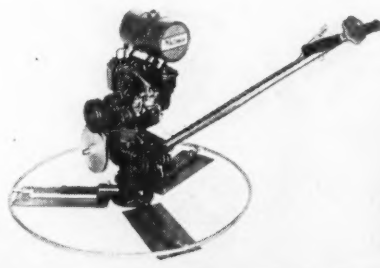
Small contractors can get big operators' machine economy on small jobs. Here's how:

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MODEL "RS", LIGHTWEIGHT RODDING MACHINE
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Put this handy Dingman pocketbook to work, in making accurate estimates for building construction, in saving time and error in the job of determining profitable, competitive prices. Based on the most practical experience, it is full of helpful pointers for new or experienced estimators, shows how to determine quantities of labor and amounts of material to produce a unit of completed work in practically every branch of building construction.

Third Edition

ESTIMATING BUILDING COSTS

By CHARLES F. DINGMAN

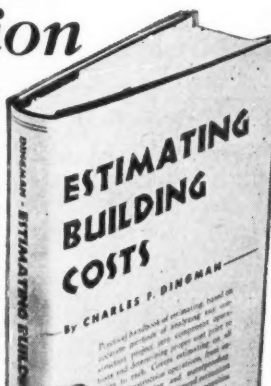
Architectural Engineer

401 pages, 4 x 6 1/4, 27 illustrations, \$3.00

This practical guidebook of estimating trains the estimator to analyze every construction job into its component parts, to apply cost data, adjusted to living conditions, to the several operations necessary, and to calculate a price that will approach the actual cost of doing the work as closely as is humanly possible.

ESTIMATING BUILDING COSTS tells how to make an estimate on a wood, brick, or concrete building construction, and covers every operation from excavating to roofing and waterproofing—with valuable material on such important details as fireproof construction, shingling, steel sash, or cement gun work. Included also are a number of useful data tables, but its primary purpose is to give the step-by-step methods that will train the reader to become a thoroughly competent estimator. This book helps you to make sure that no element of the work is overlooked, and explains the special factors to watch in dealing with each type of work.

While essentially a book of methods, ESTIMATING BUILDING COSTS contains 227 data tables and other useful reference features for the estimator, such as a reminder list of job elements, and a number of practical mathematical formulas.



Practical features

- Covers earth handling and moving so fully that the data are applicable to building operations of practically any scope and size, also to other construction operations involving this work
- Contains extensively rewritten and expanded sections on handling and finishing concrete
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Name
Address
City and State.....
Company
Position
CM-1-46

(Continued from page 182)

extent when the old pavement to be widened is of a rigid construction. This permits operation of the excavator immediately against the edge of the old pavement without much possibility that it will be disturbed in the process. When the old pavement is of macadam construction the edges are not so well defined and care must be exercised in excavating to a neat line without disturbing the old pavement.

Bituminous Concrete Mixture

In our recent construction of the narrow widening sections, we have specified the use of the same bituminous concrete mix for the widening as is used in the leveling or binder course. This same mixture is also generally used for the surface course on sections constructed outside municipalities. This mixture is known as our Type A composition in which the coarse aggregate passes the 1-in. screen. The other type of bituminous concrete mixture is designated in our specification as Type B. All the coarse aggregate for this composition passes the 1/2-in. screen. This latter type is normally used in municipal construction where a considerable amount of hand raking is generally necessary.

Use of the same base mixture as is used in the leveling course is an advantage in narrow widening especially. Our B-35 base mixture, which was used originally, permitted 10 to 20 percent of material retained on the 1-in. screen and passing the 2 in. This material tended to segregate in placing, and in the narrow base widening sections it caused difficulty in securing density immediately adjacent to the pavement being widened. This often led to further movement under traffic and frost action and caused cracking and separation to be carried through the surfacing material.

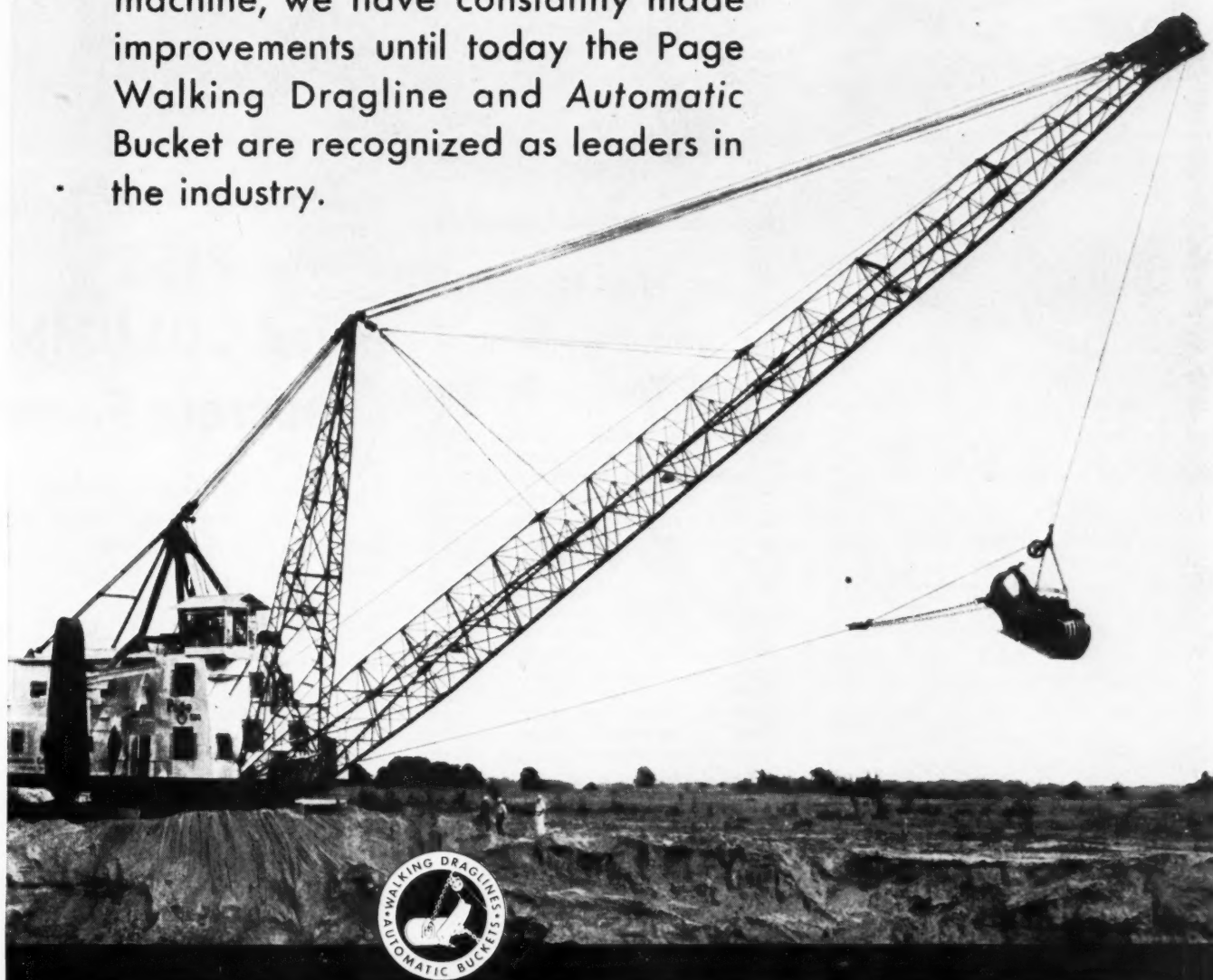
Use of the same composition mix in leveling material and base has a distinct advantage as far as contractor's plant and laying operations are concerned. He may change quickly from leveling operations to base and back again without interruptions, allowing him to keep newly opened trench for widening filled and thus avoid possible later delay. More economical operation is reflected in the bidding, and the public thus reaps a double benefit.

• • •

PART 2 OF THIS ARTICLE, to appear next month, will discuss resurfacing operations.

Pioneers . . .

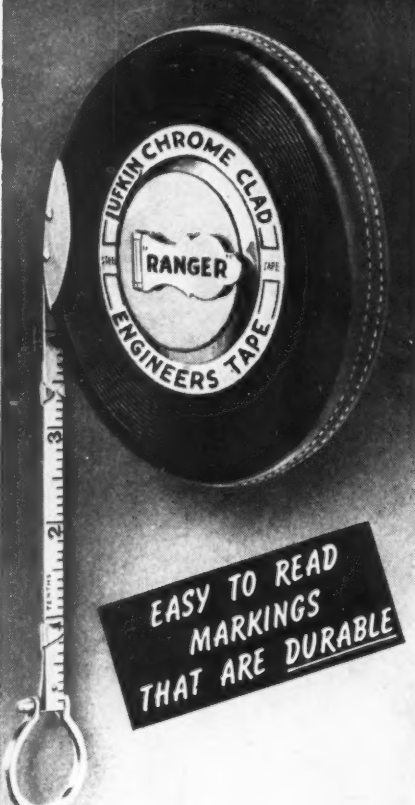
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ENGINEERING COMPANY
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10,000,000-Yd.

Earthmoving Job

(Continued from page 89)

the summer of 1944 the first contract, the clearing of a major portion of the site, was let. This work was substantially completed at the time bids were taken on the second contract which consisted principally of moving 5,200,000 cu. yd. of unclassified excavation. This figure includes the grading of 4,500 ft. of Runway No. 1, 3,700 ft. of Runway No. 2 and part of the administration area.

Contract No. 3, let by the CAA in August, 1945, provides for the extension of Runways Nos. 1 and 2 to ultimate lengths, completion of the administration area, and construction of Runway No. 3. Both

(Continued on page 188)

Easier Way To Remove Lime Scale From Diesel Cooling Systems

Built-up lime scale in water jackets or radiators is a frequent cause of over-heating in Diesel and gasoline power units. Scored cylinders, loss of power, increased consumption of gasoline and oil . . . any or all may be indications of this condition.

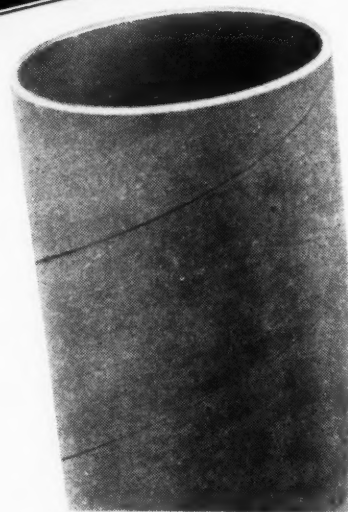
Preventive maintenance is the answer to this common trouble. Treat cooling system periodically with Oakite Compound No. 32. Its specialized action QUICKLY, effectively removes lime scale and rust that impair proper heat transfer . . . restores cooling system to normal operating efficiency. Write for FREE helpful 28-page manual containing specific recommendations for this important maintenance job.

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Smaller sizes available.

SONOTUBE is a boon to contractors where labor costs and lumber shortages are a consideration. This fibre tubing can be easily cut to lengths--(pier heights) on the job. Priced for one-time use. Minimum bracing required.

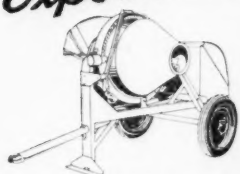
Immediate Delivery

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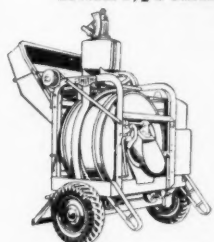
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Experience



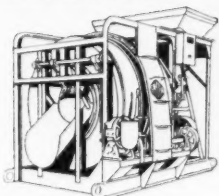
SMITH 3 1/2-S TILTER



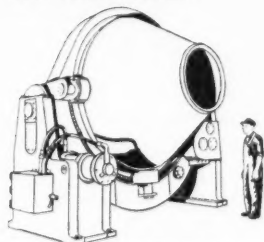
7-S TRAIL-SMITH



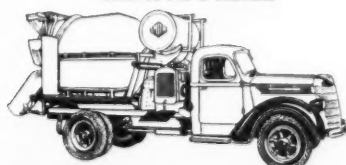
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SMITH 28-S NON-TILT



SMITH 112-S TILTER



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Modern...like an autogiro...the new Smith 16-S is just the mixer you've been waiting for. Combines smart, streamlined appearance with maximum utility. Here are only a few of its many advanced, time-tested features:

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And, of course, this new 16-S has the famous Smith drum with its fast discharge and easy rolling "end-to-center" mixing action. Available with batchhopper or feed chute, if desired. Write for literature.

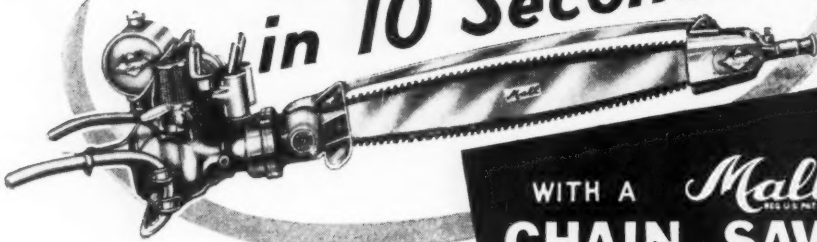
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*Mall Gasoline Engine Chain Saw.
Available in Many Cutting Capacities.*

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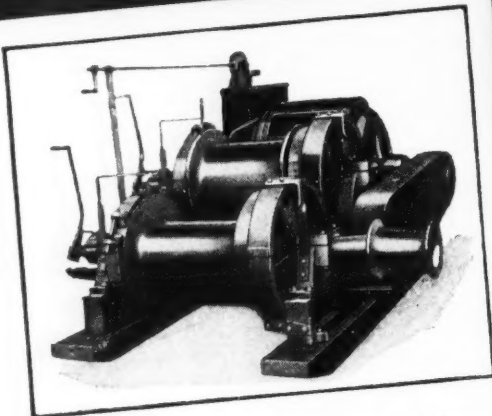
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**a hoist inquire first
of LIDGERWOOD.**



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MINES—DOCKS
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LIDGERWOOD
ESTABLISHED 1873

Manufacturing Company

MAIN OFFICE AND WORKS • ELIZABETH, NEW JERSEY

(Continued from page 186)

grading contracts, Nos. 2 and 3, are held by the Harrison Construction Co. Contracts for surface drainage, paving, administration building, hangars, lighting system and other appurtenant facilities will be let at later dates.

Design Data—Runway No. 1, the prevailing wind runway, will be 6,000 ft. long, Runway No. 2, 5,200 ft. long and Runway No. 3, 5,800 ft. long. The last, which will be an instrument runway, is laid out 0 deg. 52 min. west of true north. All runways will have 150-ft.-wide pavements of native stone base and bituminous concrete wearing surface. The maximum grade on the airport, about 1.33 percent, is on Runway No. 3. All CAA requirements are met in the design of the airport. Groundwater has not been a problem; the steep slopes and horizontal sandstone strata of the hills permit little or no accumulation of surface or underground water.

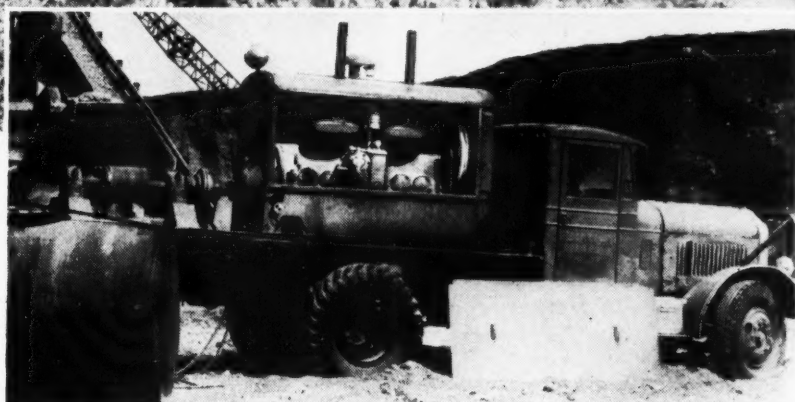
Both grading contracts have the same specifications. Earth fill is placed in 8-in. layers and compacted with approved sheepsfoot rollers. Rock fills may be placed in 24-in. layers; 10-ton three-wheel rollers are required for compaction. Benching is required under fills on original ground having slopes steeper than 1 on 3. A typical bench fill is shown in an accompanying diagram.

Drilling and Blasting

Prevalence of shale and sandstone at the Kanawha Airport site necessitates the use of explosives for nearly half of the grading yardage. Formation of the shale and sandstone in alternate layers make a considerable part of the rock removal ideal for the use of horizontal drilling. Horizontal self-feeding drills carry 6-in.-dia. holes through as much as 60 ft. of shale, under the harder overlying layers of sandstone. Cartridges, 4½-in. in diameter and 16 in. long, of 40 percent dynamite are used for blasting. Interspersing the cartridges with paper bags filled with dry fine shale, or other inert material, gives very good fragmentation. This method of drilling and blasting has been economical in the use of dynamite and has minimized damage from flying rock.

Drop weights or "headache balls" used on a fleet of truck-mounted cranes eliminate the need for sec-

(Continued on page 190)



Pioneer Rock Crushing Plant, owned by E. P. Brady, Detroit, Michigan, powered by Murphy Diesel ME-6 Industrial Power Unit . . . a full Diesel engine, 5 $\frac{3}{4}$ x 6 $\frac{1}{2}$ " , 6-cyl., 135 HP continuous, 160 HP intermittent . . . mounted on motor truck chassis.

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Because they are so compact, relatively light in weight, and efficient in heavy-duty service, they are ideally adaptable to all types of portable construction equipment or stationary power plants. . . Write for bulletin.



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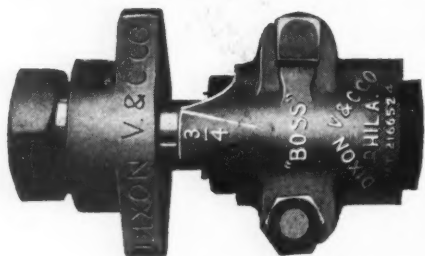
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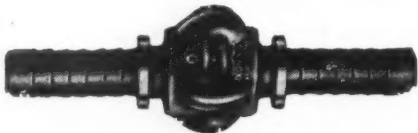
108

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"G J-BOSS" Ground Joint AIR HAMMER COUPLING

Correct design and careful workmanship make this the safest and most efficient coupling for all heavy-duty air hose service. Strong, washerless, leakproof. Tight gripping "Boss" Interlocking Clamp eliminates danger of blow-offs. Large, rugged wing nut facilitates coupling and uncoupling. Compact Type, Style XLB— $\frac{1}{2}$ " and $\frac{3}{4}$ ". Heavy Type, Style XHB— $\frac{3}{4}$ " and 1".



"AIR KING" Quick-Acting HOSE COUPLING With Auxiliary Locking Arrangement

Universal type, with a reputation for efficiency and safety on indoor and outdoor air hose jobs. Locking heads are identical for all sizes of hose and threaded pipe ends, permitting the coupling of any two sizes of hose, or hose to pipe, within the "Air King" size range, without adapters, bushings, etc. Shanks for hose are long, well corrugated and smoothly finished. A patented locking arrangement, for services of a hazardous nature or those involving excessive vibration, prevents coupling from coming apart until manually released.

Hose ends: $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ " and 1".
Male or Female Pipe Ends: $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1".

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(Continued from page 188)

ondary blasting. The drop weights reduce rock and shale to maximum dimensions without endangering or interrupting surrounding fill operations.

Excavation work encountered on the Kanawha Airport project has called for nearly every type of equipment used in grading operations except the elevating grader. A fleet of nineteen 12-yd., four 22-yd. and six 25-yd. tractor-drawn scrapers and eight Tournapull units is used on the earthwork. Rock is moved by 2- and $2\frac{1}{2}$ -yd. shovels, eighteen 12-yd. end-dump trucks, three 25-yd. side-dump trucks, and six tractor-drawn DW10 wagons. The necessary attendant equipment includes pushdozers, bulldozers, angledozers, cranes, motor graders, sheepfoot rollers, three-wheel rollers, compressors and service trucks.

Management of the spectacular grading operations at the Kanawha Airport site required considerable planning; this was divided into two phases, the operations of earthmoving and the maintenance of machinery. Maintaining and repairing so much equipment would be difficult under normal conditions, but wartime requirements for heavy con-

(Continued on page 192)

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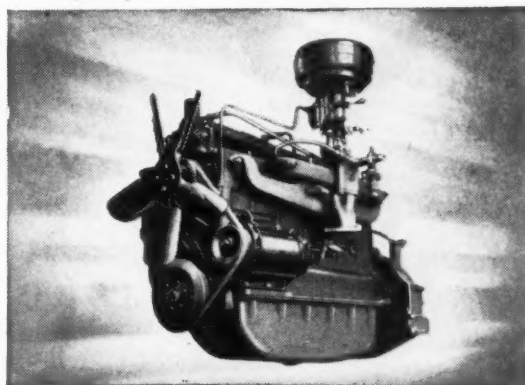
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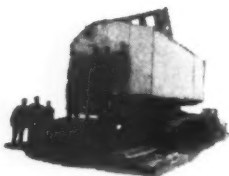
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THIS trailer, designed by Rogers Brothers to meet low headroom conditions, has been used for some time in certain sections of the country. Now, because of the larger equipment in use, it is coming into extensive use elsewhere.



ROGERS BROTHERS CORP.

ALBION, PENNA.

EXPERIENCE
builds 'em



PERFORMANCE
sells 'em

(Continued from page 190)

struction equipment have made the task even more trying. Nearly all of the equipment is more than 4 years old and has been subjected to hard usage in rush construction of war plants and facilities.

Two shifts are employed on grading operations, a day shift of 10 hr., and a night shift shortened to 8 hr. to permit proper lubrication and servicing. One stationary grease rack is used to lubricate trucks. Two portable grease racks mounted on skids and drawn by tractors are used for power shovels, scrapers, tractors and less mobile equipment. Tires are checked by crews equipped with truck-mounted compressors and tire repair outfits.

★ ★ ★

Resurfacing Strengthens Pavements

(Continued from page 118)

lin. ft. of tile drains, 6- to 10-in. dia. Total cost of improving the 10.3 mi., including all these items, came to about \$450,000, or roughly \$8.25 per lin. ft. of 40-ft. traveled way (50-ft. finished roadbed, inclusive of shoulders). Further widening of the highway is made impractical by the high cost of land abutting the narrow right-of-way, which already is being used to its full capacity.

As shown by an accompanying tabulation, each of the two 4-mi. resurfacing projects took alternate bids on stone and slag aggregate for the asphaltic concrete. On each of the two projects, the successful bidder put the same unit price per ton on asphaltic concrete, no matter whether slag or stone was used. Lower density of the slag permitted a ton of asphaltic concrete made with this aggregate to be spread farther, thus reducing the cost of pavement. Lower cost alone did not determine the award. One contract was awarded to the American Paving & Contracting Co., specifying slag, and the other was awarded to E. Stewart Mitchell, specifying stone.

Gradation of aggregates for the asphaltic concrete base course and wearing course is indicated by an accompanying table. Aggregates were heated at the mixing plants in accordance with specifications to

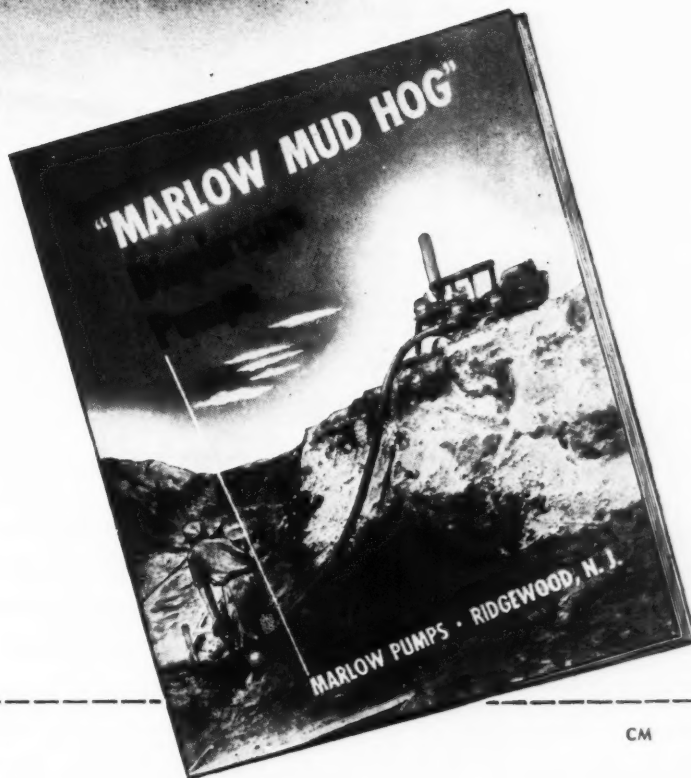
(Continued on page 194)

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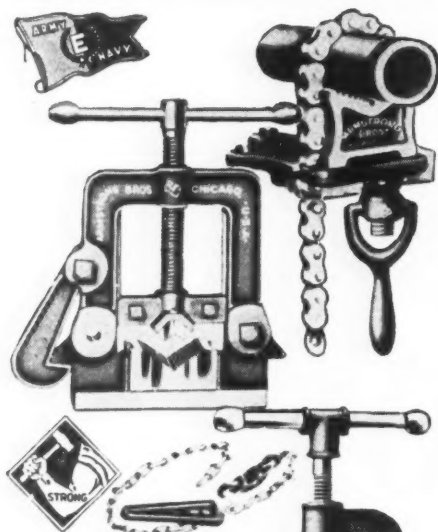
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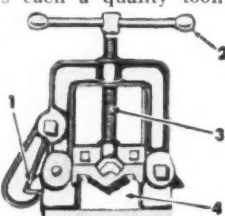
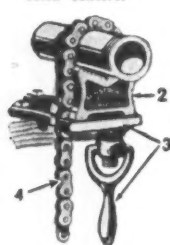


Only "ARMSTRONG BROS." Pipe Vises offer all these important features:

Solid centered jaws that prevent bending of small pipe, thin walled conduit and tubing. Oval-ended handles that will not pinch hands. Extra strength where strength is needed . . . and a fineness of design and an accuracy in machining that marks each a quality tool.

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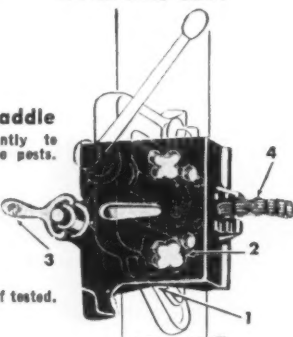


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1. Portable. Combines maximum capacity with minimum weight.
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ASPHALTIC CONCRETE—GRADATION OF AGGREGATES

Screen	Percent passing	
	Base course	Wearing course
1½-in.	100	.....
1-in.	95-100	100
¾-in.	.....	85-100
½-in.	45-85	60-95
No. 4	25-50	40-75
No. 8	20-40	.....
No. 10	.....	25-55
No. 40	3-20	10-35
No. 50	.....	.....
No. 80	.....	6-28
No. 200	0-5	4-10

This gradation applies on two of three contracts described in accompanying notes. Percentage passing No. 200 for wearing course includes mineral filler. Bitumen content for mixtures is established by State Roads Commission in range between 5.5 and 8.0 percent of total aggregate weight.

(Continued from page 192)

a temperature between 225 and 350 deg. F., and the asphalt was heated to a temperature between 250 and 350 deg. F. The temperature of the mixture delivered to the pavement is required by Maryland specifications to be between 225 and 325 deg. F. On the contract of the Eastern Highways Corp., which is representative, the temperature of the mixture when delivered to the paving machines was just slightly less

(Continued on page 196)

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Batching and Placing
Equipment . . . Hoists
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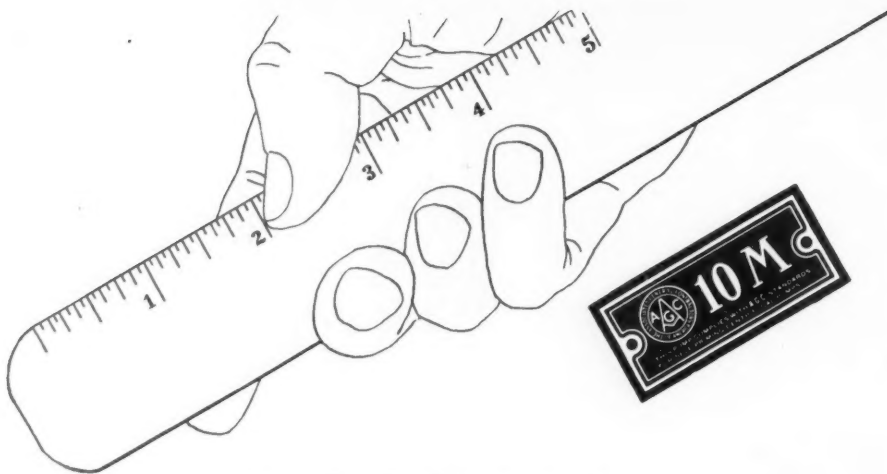
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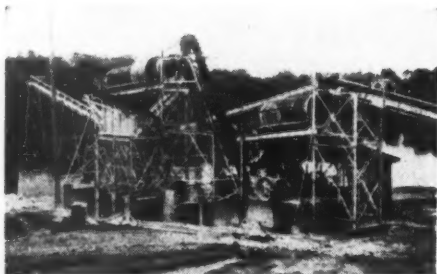
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(Continued from page 194)

than 290 deg. F., the temperature at which material was placed in the trucks at the mixing plant.

Eastern Highways Corp. Contract

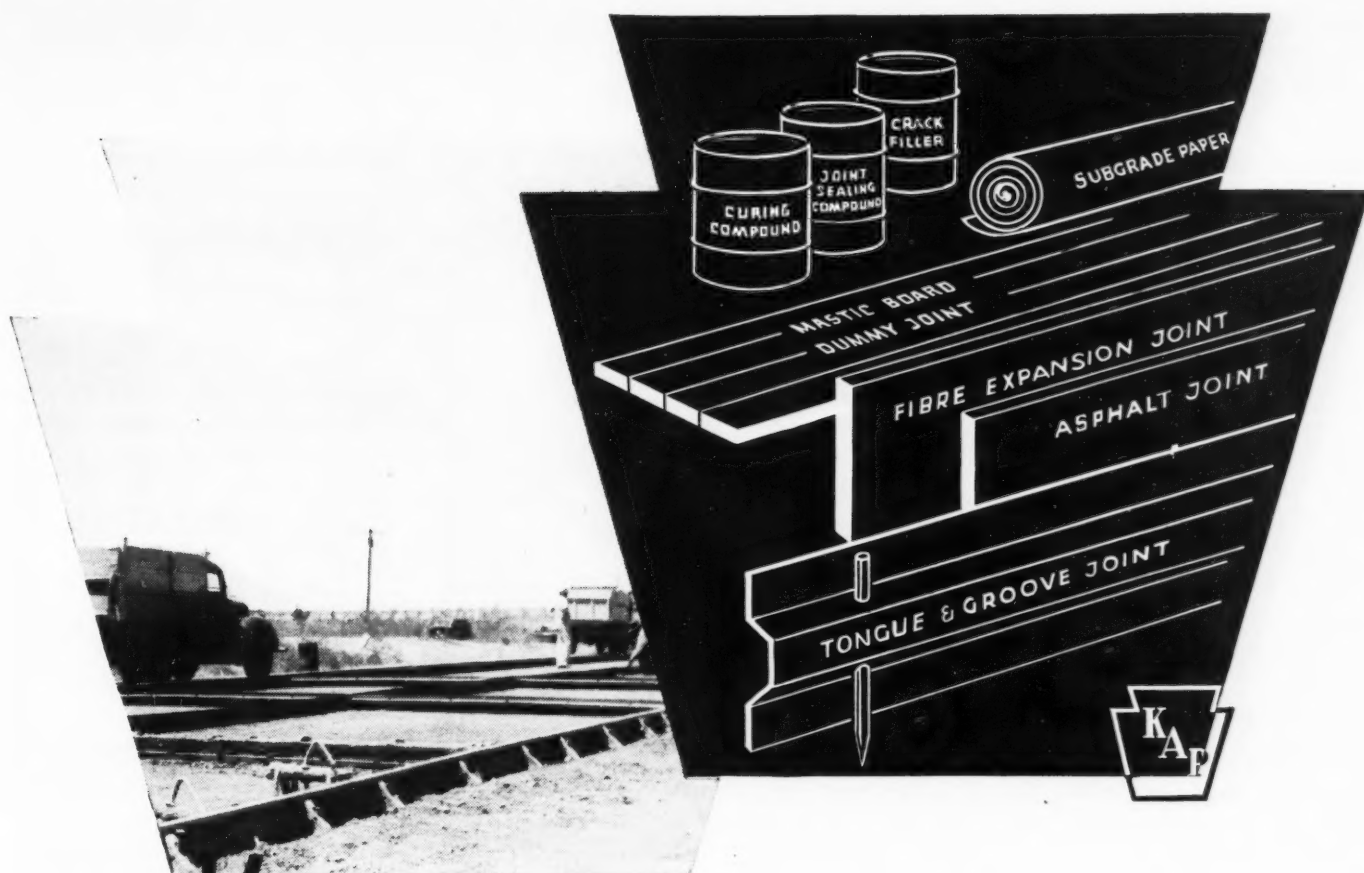
Asphaltic concrete for the 2.3-mi. contract of Eastern Highway Corp., extending from the Patapsco River to Dead Man's Curve, was mixed in 1-ton batches in the 1½-ton mixer of an old Cummer asphalt plant. This mixer had been fixed to rotate the mixture in a horizontal, as well as in a vertical, direction. The required mixing time was 1 min., of which 45 sec. was specified for wet mixing, but the contractor used a longer period of about 1 min. 30 sec. in order to give the dry material thorough mixing before adding the hot asphalt. Limiting the batch to 1 ton gave greater opportunity for blending the two sizes of stone, two sizes of sand and lime-stone filler to get a mosaic finish in the rolled pavement. Nine trucks hauling 6 to 8 tons per load transported the hot material to the paving machine. The plant turned out about 450 tons in 8 hr., and the job placed up to 600 tons in a day by working overtime.

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Direction

Robert M. Reindollar is chairman of the Maryland State Roads Commission, succeeding Ezra B. Whitman. Design and construction work is carried out under the general direction of Wilson T. Ballard, chief engineer. Thomas Linthicum is acting construction engineer. At Laurel, E. G. Duncan is district engineer in charge of all operations in District 3.



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Advertisers in this issue

Adams Mfg. Co., J. D.....127
 Allis-Chalmers Mfg. Co.....2, 3
 Aluminum Co. of America.....22
 American Bosch Corp.....41
 American Manganese Div., American Brake
 Shoe Co.....172
 American Chain & Cable Co., Inc.,
 (American Cable Division).....3rd Cover
 (Hazard Wire Rope Division).....149
 American Hoist & Derrick Co.....129, 146
 Ames-Baldwin Wyoming Co.....180
 Armco Drainage Products Assn.....36
 Armstrong Bros. Tool Co.....194
 Armstrong Rubber Co.....14
 Athey Truss Wheel Co.....45
 Atkins & Co. E. C.....162
 Atlas Powder Co.....56
 Austin-Western Co.....38, 39

Baker Co., Hugh J.....198
 Baker Mfg. Co., The.....26, 27
 Barber-Greene Co.....130
 Barco Mfg. Co., Not Inc.....159
 Bay City Shovels, Inc.....69
 Bethlehem Steel Co.....66, 175
 Black & Decker Mfg. Co., The.....8
 Blackhawk Mfg. Co.....133
 Blaw-Knox Div., Blaw-Knox Co.....15, 140
 Buckeye Traction Ditcher Co.....65
 Bucyrus-Erie Co.....169
 Byers Machine Co., The.....179

Carlyle Rubber Co., Inc.....170
 Carter Co., Ralph B.....198
 Carver Pump Co., The.....136
 Caterpillar Tractor Co.....48, 49
 C. H. & E. Mfg. Co.....198
 Chain Belt Company.....20
 C.I.T. Corporation.....44
 Cities Service Oil Co.....46
 Cleveland Rock Drill Div.,
 Cleveland Pneumatic Tool Co., The.....23
 Cleveland Trencher Co., The.....148
 Clyde Iron Works, Inc.....73
 Complete Machy. & Equip. Co., Inc.....198
 Consolidated Steel Corp.....18
 Construction Machinery Co.....194
 Contractors Hardware Corp.....198
 Contractors Pump Bureau.....196
 Cummins Engine Co., Inc.....141

Dixie Cup Co.....68
 Dixon Valve & Coupling Co.....190
 Duff-Norton Mfg. Co., The.....156
 Durant Manufacturing Co.....158

Electric Tamper & Equipment Co.....166
 Embury Mfg. Co.....172
 Euclid Road Machy. Co., The.....7

Firestone Tire & Rubber Co., The.....40
 Foote Co., Inc., The.....25
 Ford Motor Co.....171
 Fruehauf Trailer Co.....161

Galion Iron Wks & Mfg. Co., The.....137
 Gar Wood Industries, Inc.....21, 152
 Gardner-Denver Co.....165
 Gatke Corporation.....156
 General Excavator Co.....195
 General Motors Corp. (Truck & Coach Div.).....191
 General Tire & Rubber Co., The.....64
 Goodall Rubber Co.....168
 Goodrich Co., B. F.....9
 Goodyear Tire & Rubber Co., The.....74
 Gorman-Rupp Co., The.....71
 Grace Mfg. Co., W. E.....142
 Griffin Wellpoint Corp.....150
 Gruendler Crusher & Pulverizer Co.....160
 Gulf Refining Co.....153

Haiss Mfg. Co., Inc., Geo.....142
 Hazard Wire Rope Division,
 American Chain & Cable Co., Inc.....149
 Heil Company, The.....61
 Heltzel Steel Form & Iron Co.....129
 Hercules Steel Products Co.....28
 Hetherington & Berner, Inc.....53
 Homelite Corp.....50
 Hooper & Sons Co., Wm. E.....67
 Huber Mfg. Co., The.....55

Industrial Brownhoist Corp.....160
 Ingersoll-Rand Co.....47
 Ingersoll Steel Div., Borg-Warner Corp.....166
 Inland Steel Co.....2nd Cover
 International Harvester Co.....19

Jackson Vibrators Inc.....166
 Jaeger Machine Co., The.....13

(Continued on page 200)

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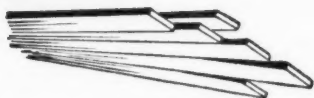
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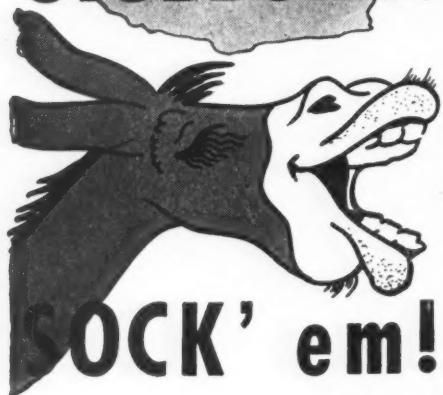
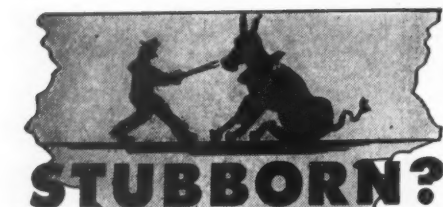
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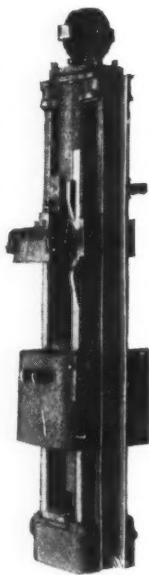
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Advertisers Index

(Continued from page 198)

Keystone Asphalt Products Co.197
Koehring Company, The163
Kotal Company, The144

Laclede Steel Co.164
LaPlant-Choate Mfg. Co., The58, 59
Laughlin Co., The Thomas176
Leschen & Sons Rope Co., A.37
Le Tournau, Inc., R. G.16, 17
Levison Steel Sales Co.6
Lidgerwood Mfg. Co.188
Lima Locomotive Works, Inc.138
Link-Belt Speeder Corp.157
Lone Star Cement Corp.5
Lubriplate Div., Fiske Bros. Refg. Co.132
Lufkin Rule Co., The186

Macwhyle Co.154
Mall Tool Co.188
Marlow Pumps193
McGraw-Hill Book Co., Inc.184, 194
McKiernan-Terry Corp.24
Mercer-Robinson Co., Inc.170
Michigan Power Shovel Co.134
Mieh Safety Appliances Co.178
Moretrench Corp.60
Murphy Diesel Co.189

National Carbide Corp.168
National Lead Co.32
Northwest Engineering Co.11
Novo Engine Co.54
Nunn Mfg. Co.140

Oakite Products, Inc.186
Osgood Co., The195
Ottawa Steel Products, Inc.174
Owen Bucket Co., The29

Page Engineering Co.185
Parkersburg Rig & Reel Co., The72
Parsons Co., The182
Petitbone Mulliken Corp.151
Pioneer Engineering Works124

Ramsey Machinery Co.198
Rapid Pavement Breaker Co.182
Raybestos Div. of Raybestos Manhattan, Inc.135
Reconstruction Finance Corp.199
Republic Rubber Div.,
Lee Rubber & Tire Corp.158
Robinson Air-Activated Conveyor Systems
Div., Morse-Boulger Destructor Co.136
Rodgers Hydraulic, Inc.139
Roehling's Sons Co., John A.183
Rogers Bros. Corp.192

Searchlight Section198
Schramm, Inc.33
Seaman Motors177
Shell Oil Company145
Shunk Mfg. Co.164
Sinclair Refining Co.70
Skilsaw, Inc.43
Smith Co., The, T. L.187
Socony-Vacuum Oil Co., Inc.62, 63
Sonoco Products Co.186
Southwest Welding & Mfg. Co.173
Standard Oil Co. (Indiana)181
Standard Oil Co. (California)143
Sterling Machinery Corp.198
Sterling Wheelbarrow Co.192
Sullivan Machinery Co.131

Templeton, Kenly & Co.190
Texas Company, The34, 35, 42
Thermoid Company12
Thew Shovel Co., The128
Timken-Detroit Axle Co., The155
Timken Roller Bearing Co., The121
Trackson Company52

Ungar Publishing, Frederick190
Union Metal Mfg. Co., The167
Union Wire Rope Corp.30, 31
United States Steel Corp., Subsidiaries123
Universal Atlas Cement Co.123
Universal Road Machinery Co.196

Viber Company, The178
Vickers Inc.10
Vulcan Iron Works200

Warner Bros. Co., The (Spiratube Div.)125
Wellman Engineering Co., The180
White Mfg. Co.176
Whiteman Mfg. Co.184
Williams & Co., J. H.57
Wisconsin Motor Corp.174
Wood Manufacturing Co.51
Wooldridge Mfg. Co.147
Worthington Pump & Mach. Corp. 200, 4th Cov.

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